



Jeb Bush
Governor

REDACTED

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

July 15, 2002

Ms. Barbara Dick
U.S. Environmental Protection Agency
Region 4
61 Forsyth Street
Atlanta, Georgia 30303

**Re: Preliminary Assessment Report / PA Scoresheets
Florida Smelting Company aka. Berman Brothers Scrap Yard
Jacksonville, Duval County, Florida**

Dear Barbara:

Please find enclosed a copy of the Preliminary Assessment(PA) Report, and PA Scoresheets for the Florida Smelting Company site. In an effort to expedite this report, the reference package will be sent to you separately. This site is a FY2002 Preliminary Assessment commitment. Based on the site file information, the site is recommended for further CERCLA action. If you have any questions please call me at (850) 488-3935. Thank you.

Sincerely,

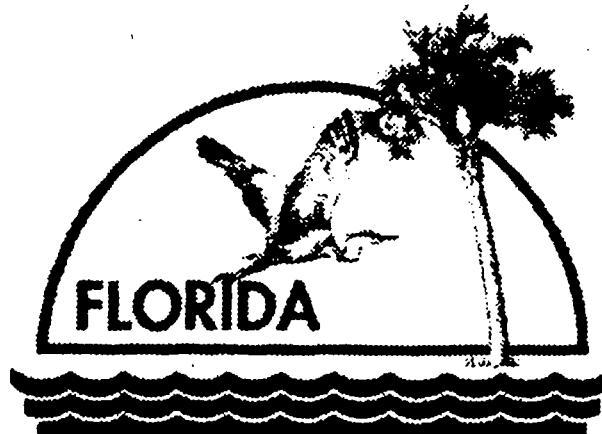
Teresa Kinner
Environmental Specialist II
Site Screening Superfund Subsection
Bureau of Waste Cleanup

Enclosure

cc: Reading File
Jim McCarthy

**PRELIMINARY ASSESSMENT
FLORIDA SMELTING COMPANY
AKA: BERMAN BROTHERS SCRAP YARD
DUVAL COUNTY, FLORIDA**

EPA ID No: _____



Prepared By:

**Florida Department of Environmental Protection
Division of Waste Management
Bureau of Waste Clean-up
Technical Review Section
Site Screening Superfund Subsection**

**A. James McCarthy Jr., P.G
Professional Geologist I
July 10, 2002**

Date: 07/10/02

Prepared by:

A. James McCarthy Jr., P.G.
FDEP

Site:

Florida Smelting Co.
Aka: Berman Brothers Scrap Yard
2726 Evergreen Avenue
Jacksonville, Duval County, Florida

EPA ID No: _____

1.0 Introduction

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Re-authorization Act of 1986 (SARA), the Florida Department of Environmental Protection (FDEP), Division of Waste Management, Site Screening Superfund Subsection conducted a Preliminary Assessment (PA) for the Florida Smelting Co. aka: Berman Brothers Scrap Yard site in Jacksonville, Duval County, Florida. The purpose of this investigation was to assess the threat posed to human health and the environment, and to determine the need for additional investigation under CERCLA/SARA or other action. The scope of the investigation included review of available file information and a comprehensive target survey.

2.0 Site Background

2.1 Location

The Florida Smelting Co. aka Berman Brothers Scrap Yard site is located at 2726 Evergreen Avenue, Jacksonville, Duval County, Florida. The approximate latitudinal and longitudinal coordinates of the site are 30° 21'16" N and 81° 38' 39" W, respectively. The site is also defined as being located in Section 6, Township 2 South, Range 27 East. From Interstate 95 (I-95) take the 20th Street Expressway (aka; US1A) east. Go past Main Street intersection to the Evergreen Avenue intersection. Take a right (head south) onto Evergreen Avenue. The site is located one block south of the intersection on the right hand (west side) side of the road [60,68] (Figures 1,2).

2.2 Site Description

The Florida Smelting Co (FSC) began operating in 1940 and since the beginning of its operations has been known to have another address of 18th Street and Evergreen. FSC

operated at the 2726 Evergreen Avenue location until at least 1946, when the site became Albright and Company, Junk. In 1950, it appears that FSC began operations at another facility at 5800 Buffalo Avenue. Berman Brothers Incorporated, a scrap metal processor, currently occupies the site and has owned the property since 1965. Over the years, the site expanded east and south and presently encompasses an area of about 18 acres. The former FSC property is contiguous with their facility at 2500 Evergreen Avenue. The Berman Brothers property consists of a warehouse (structural steel and pipe storage), the Crane Building and a furnace. Scrap metal processing and materials storage is conducted in the northern part of the property. Ferrous metal recovery and processing is conducted in the southwest portion of the property at the Motor Assembly (Shear House) area and metal shredder. The site is bounded to the north by the 20th Street Expressway and to the east by Preston Street and Florida Avenue. CSX railroad borders the site on the west while 16th and 17th street are located to the south. The site area is a mixture of industrial/commercial businesses and residential housing. A low-income single family residential housing complex is located near the site [56,60,68] (Figures 1,2,3,5).

2.3 Local Climate

Duval County has a humid, subtropical climate. The mean annual temperature in Jacksonville is approximately 69° F. The mean monthly temperatures for the warmest month (July) and coldest month (January) are approximately 82.6° F and 55.9° F, respectively. The annual rainfall in the Jacksonville averages about 54 inches. However, as a result of local thunderstorms, rainfall amounts vary from place to place within the county. Over a 30-year period (1938-68), the annual rainfall ranged from 36.83 to 77.37 inches. The majority of rainfall (60-70%) occurs between June and October during the area's wet season. The Net Precipitation and 2-year, 24 hour rainfall values for the Jacksonville area are approximately 8 and 5 inches, respectively. The FSC site is located outside the 500-year floodplain [6,7,8,9,24,35].

3.0 Site History

3.1 Operational History and Waste Characteristics-General Process

The typical secondary smelting process involved lead scrap and lead components from used car batteries. The lead posts and grids were recovered from the batteries for smelting. The smelter operation typically consisted of reverberatory or blast furnaces, which were used to produce soft pure lead or specialty alloys. As part of the refining process, some smelting operations introduced antimony, arsenic and cadmium for the desired product. The furnaces were periodically opened to remove slag (60-70% lead) and a soft pure lead product [44,46,47,49,50].

Several public health organizations and EPA have identified a number of companies that conducted secondary lead smelting in the United States. This smelting process utilized the recovery of lead metal and alloys from various forms of scrap including lead acid batteries. The FSC site was one of those companies identified in the studies.

It has been determined that lead concentrations in surface soils at smelter sites may exceed 1% near the smelters or furnaces. A study of soils at eight former secondary smelting facilities in Baltimore and Philadelphia indicated lead concentrations ranging from 306 milligrams per kilogram [mg/kg] to 2,550 mg/kg. EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) have identified lead as the leading priority contaminant at Superfund sites. Both EPA and ATSDR consider lead a serious public health problem, particularly in children [44,46,47,49,50].

3.2 Operational History and Waste Characteristics-Specific Site Process

FSC reportedly performed lead smelting. Site file information indicates that FSC used batteries as a primary feedstock for lead. The site file also indicates that a scrap yard existed at this site since the 1930's [60,68]. It is reported that ferrous and non-ferrous processing operations have been conducted in the northern portion of the site throughout its history. A metal compacting machine, which was hydraulically powered, was formerly located at the site. As a result, other sources of scrap lead were likely used at the site. The operations at Berman Brothers, Inc. consists of non-ferrous scrap processing of copper, brass, aluminum, lead, stainless steel and ferrous scrap processing and storage of new structural steel and piping supplies. Approximately 60% of the scrap operation involve new steel. However, a smelting furnace is used for aluminum and zinc extraction. The dross is reportedly stockpiled adjacent to the building. It is currently unclear whether this furnace is the same as the one used by FSC. Hundreds of transformers from the Jacksonville Electric Authority (JEA) were stored on site. This portion of the site was reportedly leased from the Jacksonville Port Authority (JPA). The oils in the transformers, which contained Polychlorinated Biphenyls (PCBs), were removed and placed into two on-site tanks (10,000 gallon and 6,000 gallon capacity). Numerous spills were reported to have occurred as a result of these activities. The owner reported that most of the oil was sold [47,55,56,60,68,110] (Figure 3).

3.3 Site Ownership

Charles Berman of Berman Brothers, Inc. 2500 Evergreen Avenue Jacksonville, Florida 32206, has been identified as a potential responsible party [PRP]. The telephone number for Berman Brothers is (904) 353-3694. The site was reportedly owned by the Wolfson family prior to World War II [63]. Very little information regarding the Florida Smelting Co. ownership is currently available.

3.4 Regulatory/Permitting History

On March 25, 1985, the Florida Department of Environmental Regulation (FDER) conducted a field inspection of the Berman Brothers property located at 2500 Evergreen Avenue. Based on the investigation, it was determined that a 275 foot x 150 foot area was impacted by spilled transformer oil. The oil was later determined to contain PCBs. The oil was stored in JEA transformers located on the property [51,52] (Figure 3). A Warning Notice Letter (NE-W-16-2348) was forwarded to Charles Berman on April 12, 1985. The

letter cited improper PCB disposal and required contaminated soil and free product removal. A groundwater contamination assessment was also requested [51,53]. Berman Brothers subsequently notified FDER that it would cooperate with the cleanup and assessment of the site [51].

On December 8, 1987, FDER notified Berman Brothers that a final report regarding cleanup and assessment of the site had not been forwarded to the Department [54]. A follow-up letter was sent by FDER to Berman Brothers on March 30, 1988 [51].

On May 26, 1988, FDER and Berman Brothers met to discuss the site. Berman Brothers stated that the transformers were acquired from JEA and that the oil had been transferred to two tanks. During the activities, oil was spilled onto the ground. FDER informed Berman Brothers that a Consent Order requiring a Preliminary Contamination Assessment Plan was needed [51,55].

On April 29, 1991, as part of the Consent Order negotiations, the Berman Brothers attorney requested that the Consent Order be limited to only the area where the transformers were received and dismantled and not the entire scarp yard site [56]. On July 25, 1991, FDER and Berman Brother entered into a Consent Order (OGC File No. 91-0681). The Consent Order pertained only to the portion of the site where transformers were received and dismantled. The Consent Order required a Preliminary Contamination Assessment be conducted under the requirements of the Department's Corrective Actions for Groundwater Contamination Cases document [57].

In August 1991, a Preliminary Contamination Assessment Plan (PCAP) was submitted to FDER by the Berman Brothers consultant, Pitman Hartenstein & Ashe, Inc (PH&A) [58]. The plan called for groundwater and soil assessment in the area of former transformer activities. FDER approved the plan on October 18, 1991 provided the consultant provide FDER with the parameter sampling protocol [59].

In February 1992, PH&A and Intergrated Environmental Solutions Inc (IES) submitted the Preliminary Contamination Assessment Report (PCAR) to FDER for the Berman Brothers Inc. site. Detectable levels of PCBs and lead were found in the site soils and groundwater. Free phase hydraulic oil was also detected in groundwater. Please refer to Section 3.5.1 for a detailed discussion of the PCAR results [60]. On February 25, 1992, FDER completed its review of the PCAR and notified Berman Brothers that further contamination assessment and remediation was required [61].

On June 9, 1992, PH&A submitted an Initial Remedial Action Plan (IRAP) for the site. This plan was prepared by D.L. Smith and Associates (DLS) and addressed further soil assessment, soil excavation and free product recovery of oil from impacted groundwater [62].

A Contamination Assessment Plan (CAP) was submitted to FDER by PH&A and DLS on September 8, 1992. The CAP included additional monitor well installation, soil sampling,

groundwater sampling of the existing and newly installed wells and laboratory testing of the samples. This plan addressed only the area of transformer storage and oil draining operations [63]. FDER completed its initial review of the CAP on January 4, 1993 and forwarded comments to DLS [64]. DLS responded to the comments on March 23, 1993 [66]. FDER ultimately approved the CAP, with revisions, on June 22, 1993 [67].

On March 23, 1993, PH&A provided FDER with a summary of the Initial Remedial Action (IRA) conducted at the Berman Brothers site. This IRA included the removal of approximately 3,000 gallons of contaminated groundwater and 150 gallons of free product (hydraulic fluid/lubricating oil). The product recovery system utilized an open excavation for the recovery of free product. Both the free product and contaminated groundwater were stored in separate tanks at the site. Approximately 450 tons of contaminated soil was reportedly excavated and sent to Recycling Alternatives, Inc in Adel, Georgia for incineration [65,93].

A Contamination Assessment Report (CAR) was completed by DLS and submitted to the Florida Department of Environmental Protection (FDEP) on February 23, 1994. The report indicated that the IRA resulted in 595.4 tons of contaminated soil being removed and shipped to Roswell Asphalt Co in Kingsland Georgia for use in the asphalt manufacturing process. In addition, approximately 400 gallons of hydraulic fluid/lubricating oil product was recovered from a shallow pond constructed in the area containing free oil product [68,93] (Figure 5).

The contamination assessment included the installation of additional monitor wells, soil sampling, groundwater sampling of the existing and newly installed wells and laboratory testing of the samples. This assessment addressed only the area of transformer storage and oil draining operations. PCBs were detected in a groundwater sample. Soil samples collected at the site contained barium and PCBs. DLS concluded that the phase separated hydraulic fluid/lubrication oil was confined to a small area of the site [68] (Figure 5). Please refer to Section 3.5.2 for a detailed discussion of the CAR results.

FDEP completed its review of the CAR on May 2, 1994. FDEP requested additional information regarding the fate of the free product recovery excavation, the extent of free product contamination and the soil assessment plan [69]. Earth Systems, formerly DLS, responded to the FDEP comments on May 17, 1994. Earth Systems indicated that the on-site excavation was temporary and would be filled in when the free product recovery operation was complete. The results of a recent qualitative soil survey were presented in the reply. Additional soil assessment plans were also indicated. Please refer to Section 3.5.3 for a detailed discussion of the qualitative soil survey results [70].

FDEP reviewed the soil survey results on July 14, 1994 and requested that the area of soil assessment be expanded to the south and west of the original free phase plume area. FDEP also requested that the proposed soil sampling grid system for PCB delineation be expanded to include the MW-4 area. FDEP also indicated that additional recovery wells could be necessary [71]. Earth Systems responded to the FDEP letter on September 12,

1994. Earth Systems indicated that an additional qualitative soil survey would be conducted and proposed expanding the soil-sampling grid for PCB contamination delineation [72]. On September 22, 1994, FDEP agreed with the changes in scope and advised Earth Systems to proceed with additional contamination assessment of the site [73].

On October 4, 1995, FDEP sent a Warning Letter (WL95-0082 CU16-NED) to Berman Brothers for failure to copy with the terms of the Consent Order. On February 9, 1996, Berman Brother informed FDEP that additional assessment activities had been conducted at the site. FDEP indicated that unless a CAR Addendum was submitted, the Department would pursue legal action [74]. Earth Systems faxed the recent soil sample results to FDEP on February 9, 1996 [75]. On February 13, 1996, based on a review of the faxed information, FDEP issued a Non-Compliance Letter (NCL96-0001-NED) to Berman Brothers Inc. FDEP based the letter on the limited scope of assessment conducted at the site since the execution of the Consent Order [76].

On April 1, 1996, Earth Systems Group Inc. responded to the Department's Non-Compliance letter. The letter included the results of recent contamination assessment addendum activities undertaken at the Berman Brothers site. Additional PCB soil contamination was noted. Since no additional free phase product was detected in the temporary well points, Earth Systems indicated that no additional recovery wells were necessary. The letter report also outlined additional soil boring assessment plans for the site [77]. Please refer to Section 3.5.3 for a detailed discussion of the additional assessment results. FDER completed its review of the CAR addendum on April 4, 1996. FDEP requested additional assessment of PCBs in the SB-2 and MW-4 areas. FDEP also forwarded questions regarding the character of the free phase product [78] (Figure 6).

On June 4, 1996, Berman Brother Inc. notified FDEP that the product recovery excavation had been closed out with clean fill. In an effort to return the area for scrap yard operations, Berman Brothers offered to conduct long term groundwater monitoring and perform addition assessment of the SB-2 and SB-4 areas [79] (Figure 6). The same day, Earth Systems responded to the FDEP CAR Addendum comments. Additional groundwater and soil assessment results were included in the response [80]. Please refer to Section 3.5.3 for a detailed discussion of the post CAR addendum assessment results.

On August 7, 1996, representatives from FDEP and Berman Brothers met to discuss the site progress. A summary of the meeting was presented in a September 17, 1996 letter sent to Berman Brothers. Soil cleanup goals and soil excavation requirements were discussed. Additional soil sampling was required in the SB-1 area to determine the extent of PCB contamination. The extent of Total Petroleum Hydrocarbon contamination in the SB-17, PB-1 and PB-2 areas also needed to be determined. Post IRA groundwater-monitoring requirements were also discussed [82] (Figure 7)

On September 2, 1996, Berman Brothers notified FDEP that it would excavate and dispose of oil stained soil. Berman Brothers indicated that the excavated soil would be

properly disposed and the area would be covered with clean back fill. Berman Brothers also indicated that additional groundwater and soil assessment would be conducted to delineate the extent of the free product plume and PCBs, respectively [81]. Berman Brother notified FDEP on November 22, 1996 that an additional 27,980 pounds of oil stained soil had been removed from the site and disposed. A follow-up letter from FDEP on January 7, 1997 notified Berman Brothers of the documentation requirements [83].

On December 12, 1997, FDEP notified Berman Brothers that additional soil assessment was necessary. FDEP also expressed concerns regarding the length of time that had transpired to complete the assessment and remediation requirements of the 1991 Consent Order [87].

On July 8, 1998, an attorney for Berman Brothers Inc. informed FDEP that PCB contaminated soil had been excavated from the site and disposed at the Kedesh, Inc. Soil Recycling facility in Screven, Georgia. FDEP subsequently received invoices from the facility documenting the receipt of 908.09 tons of non-hazardous petroleum contaminated soils [88,89]. The area of soil excavation was estimated to be 80 feet by 40 feet and 4 feet deep. However, the attorney informed FDEP that the fill material placed in the excavation had shown to be contaminated by PCBs. This material was purchased from a north side Jacksonville location. The attorney indicated that the fill sample analytical results would be forwarded to FDEP [88]. The analyses subsequently forwarded to FDEP indicated the presence of PCBs in the fill material [91]. Please refer to Section 3.5.3 for a detailed discussion of the fill material PCB results.

On July 24, 1998, FGS-Jacksonville, Inc. reported the results of PCB soil testing at the off-site source pit for the fill. No PCBs were detected in the soil samples collected from the loading area adjacent to the excavation. As such, FGS determined that the contaminated fill placed at the Berman Brothers site did not originate from this area [90].

A meeting was held between FDEP and Berman Brothers representatives on July 29, 1998. It was determined that no evidence of PCB contamination from the fill source site existed. Berman Brothers representatives indicated that a Supplemental Contamination Assessment Plan would be delivered to FDEP in August 1998 [92]. A Supplemental Contamination Assessment Plan (SCAP) was submitted to FDEP on October 1, 1998. The plan called for additional soil assessment of PCBs near the SB-2 boring location. FDEP deemed that the SCAP was acceptable provided the plan include additional analyses in the area between SB-4 and SB-13 [93] (Figure 7).

On September 27, 1999, Dominion completed a Supplemental Contamination Assessment Report (SCAR) for the Berman Brothers Site. The report was received by FDEP on October 20, 1999. PCBs were detected in soil samples in excess of the State industrial cleanup criteria for PCBs. Please refer to Section 3.5.3 for a detailed discussion of the soil assessment results. Dominion recommended a number of remedial options including soil excavation and disposal or disposal in combination with institutional controls such as asphalt or concrete paving [94]. FDEP notified Dominion on October 21, 1999 that the

SCAR and previous assessment reports adequately defined the extent of PCB contamination and that an Interim Remedial Action Plan (IRAP) needed to be submitted. FDEP also stated that the IRAP needed a proposal for post excavation confirmatory soil sampling, groundwater quality assessment and plans for institutional controls [95].

Dominion submitted an IRAP to FDEP on December 1, 1999. To further delineate the extent of PCB soil contamination, additional soil sampling was proposed. Following the delineation, the IRAP called for excavation and transportation of PCB contaminated soils to a soil treatment facility. Confirmatory soil sampling would then be performed. The State residential PCB SCTL of 0.9 mg/kg was established as the soil cleanup goal. Additional monitor wells would be installed to supplement the existing wells in order to assess groundwater quality [96]. FDEP subsequently reviewed and approved the IRAP on December 2, 1999 [97].

On February 18, 2000, Dominion notified FDEP that the additional soil assessment had been completed and the excavation portion of the IRAP was about to commence [98]. On July 21, 2000, since an Interim Remedial Action report had not be received, FDEP sent a letter to Berman Brothers Inc. informing them that they had 15 days to report the progress of the project [99].

On January 5, 2001, Dominion forwarded a letter to FDEP with an IRAP update of the Berman Brothers site. Dominion attributed the Interim Remedial Action delays to equipment and weather problems. The letter indicated that the removal and disposal phase had been completed. Groundwater and confirmatory soil samples were reportedly collected on November 27, 2000. No PCBs were detected in the groundwater samples. However, several of the soil sample locations (C-2, C-3, C-4 and C-8) had PCB levels in excess of the State residential SCTL. Berman Brothers agreed to additional soil sampling in those areas [100].

On June 18, 2001, Dominion completed an Interim Remedial Actions report for the Berman Brothers site. The report was subsequently forwarded to FDEP on June 19, 2001. The report summarized the assessment and remedial actions taken at the site. These actions included additional soil assessment activities, excavation and removal of 435 tons of PCB contaminated soil and confirmatory soil and groundwater testing. Based on the test results, Dominion recommended that No Further Action be taken at the site [101]. Please refer to Section 3.5.3 for a detailed discussion of the Interim Remedial Action report results.

FDEP forwarded a letter to Berman Brothers on July 17, 2001 with its comments regarding the Interim Remedial Action report. A number of deficiencies were noted. These included improper confirmation sampling techniques, inadequate backfill testing and disposal manifest deficiencies [102].

On December 10, 2001, Dominion responded to the Department's comments on the Interim Remedial Action report. The response letter included revised laboratory reports

and stated that the confirmatory sampling techniques had been previously approved by FDEP. Dominion stated that the source of the backfill was four lakes from an unused, undeveloped subdivision and it was unlikely that PCBs originated from this area. Dominion attributed the PCB detections in the fill to absorption and/or laboratory errors. Dominion also indicated that since the PCB levels were not elevated enough to be considered hazardous waste, the Kedesh soil treatment facility was an appropriate location for disposal [103].

On December 13, 2001, FDEP contacted the Georgia Department of Environmental Protection (GDEP) regarding the fate of the contaminated soil from Berman Brothers. GDEP indicated that Kedesh was not a permitted PCB disposal facility and that Toxicity Characteristic Leaching Procedure (TCLP) testing was not performed as required. Kedesh also indicated that it had no record of soil received from Berman Brothers for the October-November 2000 time frame [104].

FDEP sent a letter to Berman Brothers on December 18, 2001 regarding the Interim Remedial Action deficiencies. FDEP indicated that the revised laboratory report and confirmation soil sampling responses were acceptable. However, FDEP requested a Disposal Manifest or a Certificate of Treatment for the PCB contaminated soils. In addition, FDEP notified Berman Brothers that a disposal facility must be certified to accept PCB wastes. Documentation for the waste processing/disposal facility was requested [105].

On January 17, 2002, FDEP's Office of General Counsel (OGC) sent a letter to Berman Brothers requesting a Disposal Manifest or Certificate of Treatment for the 435 tons of PCB contaminated soil that reportedly took place in October 2000. FDEP informed Berman Brothers that they had 14 days to provide the documentation or FDEP would consider filing a Petition to Enforce the Consent Order [106]. To date, no documentation regarding the proper disposal of the PCB contaminated soil has been received by FDEP [108].

On February 28, 2002, GATX Railroad delivered a tanker car to Berman Brothers from Georgia for scrap. The tanker car was manifested as clean. However, some residues still remained. A worker at the scrap yard started to cut up the old tank car for scrap metal. However, a black liquid started to leak onto the ground. About 400 gallons of what was later identified as "black liquor" spilled from the tanker onto the ground. A contractor hired by Berman Brothers Inc subsequently cleaned up the spill. The cleaning contractor, Environmental Recovery, now Mirand Environmental, notified FDEP of the spill on March 6, 2002 of the cleanup [107].

In late 2001, EPA referred five secondary lead smelting sites, including the FSC site, to the FDEP for prescreening. FDEP completed a Pre-CERCLIS Screening Assessment Checklist/Decision report on April 25, 2002. The report identified the site location, described potential lead problems possibly associated with the site and identified

potential receptors. Based on the findings of the report, the site was recommended for entry onto CERCLIS [43,45,48].

In April 2002, FDEP completed a Windshield Survey of the FSC site. The survey pinpointed the site location and noted that the site was active and occupied by a scrap metal company. Large piles of scarp metal, including old tanks, were visible. The site was partially fenced. However, site access was not restricted [109].

3.5 Sampling and Analysis

Based on a review of the site file, it appears that the sampling activities were limited to the area where transformer operations took place.

3.5.1 Preliminary Contamination Assessment Results

A PCAR was submitted to FDER in February 1992. The fieldwork for the preliminary contamination assessment was conducted between August 1991 and January 1992. The assessment included a groundwater flow evaluation, monitor well installation and groundwater/soil sampling analysis [58,60].

Three piezometers were installed to determine groundwater flow across the site. The water table elevations measured in August 1991 indicated a south-southwest groundwater flow direction. [58,60] (Figure 3). However, water table elevations measured in January 1992, using both the piezometers and monitoring wells, indicated a groundwater flow direction to the north and north-northwest [58,60] (Figure 3).

Three monitor wells (MW-2, MW-3 & MW-4) were installed in the area of the transformer storage and drainage activities. The wells were constructed of 2-inch diameter, Schedule 40 PVC. Monitor well MW-1 was installed to the north, adjacent to the Crane building, for background purposes. The wells were installed to a depth of 12 feet below land surface (bls). This included ten feet of slotted (0.01 inch) PVC screen. Groundwater (two rounds) and soil samples were collected and analyzed for PCBs and total metals (eight RCRA metals) [60,68] (Figure 4).

Soil samples were collected in early December 1991. A composite soil sample was collected at each monitor well location. The sampling interval included from land surface to the water table interface. Barium (1.08 milligrams per kilogram [mg/kg] to 5.14 mg/kg) was detected in all four soil samples. PCBs were detected in the soil samples collected from MW-2 (5 mg/kg) and MW-4 (3 mg/kg). Chromium (1.16 mg/kg) was detected in the soil sample from MW-3. Lead was detected in the soil samples from MW-2 (7.6 mg/kg), MW-3 (40.8 mg/kg) and MW-4 (2.9 mg/kg). It should be noted that the highest level of lead was detected from the soil sample collected nearest the furnace [60] (Figure 4).

The initial round of groundwater sampling was conducted on December 3, 1991. Oil free product, greater than two feet in thickness, was observed in monitor well MW-2. Barium (0.096 milligrams per liter [mg/l] to 0.446 mg/l) was detected in all four wells. PCBs were detected in monitor well MW-2 (5 micrograms per liter [ug/l]) and MW-4 (10 ug/l). Lead was detected in monitor wells MW-1 (0.483 mg/l), MW-2 (0.065 mg/l), MW-3 (0.525 mg/l) and MW-4 (0.44 mg/l). Again, the highest levels of lead were detected in the sample (MW-3) located closest to the furnace. The lead levels were in excess of the existing primary drinking water standard (PDWS) of 0.05 mg/l. The PCB concentrations were in excess of the State Groundwater Guidance Concentration of 0.5 ug/l. A second round of sampling was conducted between January 9 and January 27, 1992. Only the wells that had previously shown PCB and lead contamination were sampled and analyzed. No PCBs or lead were detected above the detection limit. The consultant attributed the initial lead and PCB detections to soil disturbance during well installation and turbidity problems [60] (Figure 4, Tables 1-3).

On June 12, 1992, a soil sample (SS-1) was collected near monitor well MW-2 for polynuclear aromatic hydrocarbons [PAHs] (EPA Method 8310) and PCB (EPA Method 8080) analysis. The sample was collected using a hand auger just above the water table interface. A number of PAH and PCB compounds were detected. The PAH contaminants included benzo [a] anthracene (88 micrograms per kilogram [ug/kg]), benzo [k] fluoranthene (31 ug/kg), dibenzo [a,h] anthracene [51 ug/kg], fluorene (13 ug/kg), phenanthrene (84 ug/kg), 1-methylnaphthalene (34 ug/kg) and 2-methylnaphthalene (42 ug/kg). Arochlor 1248, (8 mg/kg), a PCB compound, was also detected [68] (Figure 4).

3.5.2 Contamination Assessment Results

On February 25, 1994, DLS (aka: Earth Systems) completed a CAR for the Berman Brothers site. As detailed earlier, the contamination assessment included the installation of additional monitor wells, soil sampling, and groundwater sampling of the existing and newly installed wells and laboratory testing of the samples. This assessment addressed only the area of transformer storage and oil draining operations. The fieldwork for the contamination assessment was conducted between September 1993 and February 1994 [68].

Field screening was conducted during the installation of the new monitor wells. Soil samples were collected from land surface to 3 feet bls. The selected samples were subsequently screened using an Organic Vapor Analyzer (OVA) equipped with a Flame Ionization detector (FID). A soil sample collected from 3 feet bls from monitor well MW-7 had a total vapor reading of 15 parts per million [PPM]. Low levels of vapors were also detected in the MW-8D 1-foot (2 PPM) and 3 foot (4 PPM) samples. None of the other soil samples collected from the well borings exhibited any detectable vapor readings [68] (Figure 5).

On September 14, 1993, during the installation of the new monitor wells, soil samples were collected from MW-6 and MW-8D for laboratory analysis. The samples were

composted from land surface to the water table interface (approximately 3 feet bls). The samples were analyzed for RCRA metals, PCBs and PAHs. Low levels of barium (3 & 4 mg/kg) and chromium (3 & 3 mg/kg) were detected in the two samples. Arochlor 1254 (54 ug/kg) and Arochlor 1248 (54 ug/kg) were detected in the soil samples from MW-6 and MW-8D, respectively. No PAH compounds were detected above the minimum detection limits [68] (Figure 5, Table 2).

Four monitor wells (MW-5, MW-6, MW-7 & MW-8D) were installed on September 14, 1993 to delineate the area of contamination. The wells were constructed of 2-inch diameter, Schedule 40 PVC. Monitor wells MW-5, MW-6 and MW-7 were installed to a depth of 17 feet bls with 15 feet of slotted (0.01 inch) screen. Monitor well MW-8D was installed to a depth of 35 feet with 5 feet of slotted screen [68] (Figure 5).

Groundwater samples were collected on November 2, 1993 and February 4, 1994. Both the existing and newly installed wells were sampled during the November 1993 sampling event for PCBs (EPA Method 608) and PAHs (EPA Method 610/8100). No metals analysis was conducted. Monitor well MW-2 was not sampled due to the presence of free product. Arochlor 1242 (250 ug/l) and arochlor 1260 (11 ug/l), PCB compounds, were detected in monitor well MW-4. No other PCBs or PAHs were detected in the groundwater samples. Monitor well MW-4 was resampled on February 4, 1994. Both filtered (dissolved metals) and unfiltered (total metals) samples were collected for PCB analysis. The aliquot for PCB dissolved metals analysis was poured directly from the bailer through a 45-micron filter. Arochlor 1242 (200 ug/l) and arochlor 1260 (8.2 ug/l) were detected in the unfiltered (total metals) sample. No PCBs were detected, above the minimum detection limit, in the filtered (dissolved metals) sample. DLS attributed the PCBs detected in the unfiltered sample to suspended sediments in the water column [68] (Figure 5, Table 3).

Water table elevations were measured in the monitor wells on three separate occasions (11/2/93, 1/7/94 & 1/31/94). Groundwater flow across the area of investigation was generally to the northwest and north-northwest. However, groundwater was determined to flow east-northeast and northeast during high water table conditions [68].

3.5.3 Post Contamination Assessment Report Results

A qualitative soil survey was conducted by Earth Systems in May 1994. Nineteen soil borings (S1 to S19) were conducted to further delineate (visually and olfactory) the extent of free product at the site. Stockpiled scrap metal and soil, located south and west of the area, were removed to conduct the survey. Additional areas of free product and oil odors were identified at the Berman Brothers site between the railroad spur and the recovery system excavation [70] (Figure 5).

On October 27, 1995, five soil borings were installed at the Berman Brothers Inc. site. Five additional borings and three temporary well points (TWP-1, TWP-2 & TWP-3) were installed on February 21, 1996. However, soon after installation, one of the well

points (TWP-3) was destroyed by on-site activities. Soil samples were collected from the ten soil borings (S1 to S10) for PCB analyses [77]. The well points were installed to identify free phase hydrocarbons southwest of the pond. The two remaining wells (TWP-1 & TWP-2) were equipped with an oil interface meter for the detection of free product. No hydrocarbon odors, staining or free product were noted in the two remaining well points. No groundwater samples were collected for laboratory analysis [77] (Figure 6).

Soil samples for PCB laboratory analysis were collected from shallow (6"-12") and subsurface (18"-24") depths. PCBs (1.21 mg/kg to 91 mg/kg) were detected in soil samples from SB-1, SB-2, SB-3, SB-4 and SB-5. The highest levels of PCBs (91 and 67.5 mg/kg) were detected in the soil samples collected from SB-2, which was situated adjacent to the east side of the railroad spur. No PCBs were detected in the scrap metal area located west of the railroad spur [77] (Figures 6,7; Table 4).

Between May 14 and 16, 1996, as part of the CAR Addendum, further assessment activities were conducted in the area of free phase oil and PCB contamination. Seven additional soil borings (SB-11 to SB-17) were conducted. A new monitor well (MW-9) was installed near the SB-2 location. In addition, two sediment samples from the excavation pond bank (Pond Bank 1 & 2) were collected. A sample of hydraulic oil was collected for comparison (chromatogram) purposes. The soil samples from the borings were collected from 6-inches and 24 inches bls. The soil samples from borings SB-11 to SB-16 were analyzed for PCBs (EPA Method 8080) only. The soil samples from boring SB-17 and the sediment samples were subjected to Total Petroleum Hydrocarbon [TPH] (EPA Method 8015) analyses. TPH analysis was also performed on the hydraulic oil sample. Groundwater samples were collected from newly installed monitor well MW-9 and existing well MW-4 for PCB analysis [80] (Figure 7).

PCBs were detected in the soil samples (surface soil/subsurface soil samples) collected from SB-11 (38 ug/kg/no detect [ND]), SB-12 (ND/61ug/kg), SB-13 (416 ug/kg/339 ug/kg), SB-14 (100 ug/kg/ND) and SB-16 (570 ug/kg/ND). The highest levels of PCBs were centered on the SB-2 and SB-3 locations. TPHs were detected in sediment samples Pond Bank 1 (24,000 mg/kg) and Pond Bank 2 (430 mg/kg). TPHs (22,000 mg/kg & 15,000 mg/kg) were detected in the soil samples collected from soil boring SB-17. Arochlor 1242 (13.2 ug/l) and arochlor 1254 (2.5 ug/l) were detected in monitor well MW-4. Earth Systems attributed the PCB contamination in MW-4 to suspended sediments. No PCBs were detected, above the detection limit, in the MW-9 groundwater sample [80] (Figure 7).

No petroleum hydrocarbons from the gasoline or kerosene range were reportedly found in the chromatogram analyses of the free phase oil. However, low levels of petroleum hydrocarbons were detected in the motor oil range [80].

On February 11, 1997, Dominion Professional Environmental Geosciences (Dominion), a new environmental consultant, collected 15 soil samples at the Berman

Brothers site. Ten of the samples (SB-18 to SB-21 and SB-27 to SB-32) were collected from 1 foot bls. These samples were analyzed for PCBs (EPA Method 8080). The other five samples (SB-22 to SB-26) were collected at a depth of 6-inches and analyzed for TPHs (EPA Method 3550 [FLO-PRO]). No TPHs were detected above the minimum detection limit. However, PCBs (0.85 to 39 mg/kg) were detected in eight of the ten soil samples. The highest levels were detected in soil samples (SB-27, 28, & 29) located just east of the railroad spur. All eight samples had PCBs in excess of the State residential Soil Cleanup Target Level (SCTL) for PCBs (0.8 mg/kg). Six of the samples exceeded the industrial SCTL (3.8 mg/kg). As part of the assessment, a piezometer (P-1) was installed near the railroad spur. No significant odors or free product were noted [84] (Figure 8).

On September 22, 1997, Dominion submitted soil sample results to FDEM for the Berman Brothers site. Eight additional soil samples (SB-33 to SB-40) were collected on August 18, 1997. The samples were collected between the cast pile and the furnace. Each of the samples was collected from one foot bls and analyzed for PCBs. PCBs were detected in four of the samples (SB-34, 38, 39 & 40) ranging from 2.02 mg/kg (SB-34) to 9.69 mg/kg (SB-39). All four of the PCB concentrations exceed the State residential SCTL for PCBs. Three of the samples exceeded the industrial SCTL [34,85] (Figure 9). Based on this and previous sampling activities, two areas of concern, greater than 9 mg/kg of PCBs, were identified. This included the areas on the east side of the railroad spur and west of the furnace [86].

Soil samples were collected by Dominion on June 11, 1998 and July 18, 1998 from fill material deposited at the Berman Brother site. PCBs (7.71 mg/kg to 1,154.4 mg/kg) were detected in thirteen of the twenty-seven soil samples [91].

Between March 18, 1999 and August 20, 1999, Dominion conducted fieldwork for the Supplemental Contamination Assessment of the Berman Brothers site. Twenty-seven borings (SB2, P-1 to P-26) were conducted in the areas of previous transformer activities and free phase oil detection. Soil samples were collected using a Geoprobe Model 5400. A four-foot continuous core barrel with dedicated polystyrene sleeves was employed to collect the soil samples. Soil samples were collected at 0-1 foot bls, 1-2 feet bls and 2-3 feet bls intervals. However, when the water table was shallow, some of the deep soil samples were collected at a shallower depth interval (24-30 inches bls). The soil samples were initially field screened for PCBs using the Triangle Diagnostics PCB On-Site Soil Analysis method. Using this screening method, samples from fourteen of the borings (P-1 to P-3, P-5, P-8, P-11, P-13 to P-20) were determined to contain PCBs greater than 1 mg/kg. In addition, a number of the soil samples had PCBs greater than 10 mg/kg. Soil samples exhibiting field screening levels between 1 mg/kg and 10 mg/kg were collected for PCB laboratory analysis (EPA method 8082) on March 18, 1999, April 2, 1999 and August 20, 1999. Field screening concentrations greater than 10 mg/kg were accepted as valid representations and therefore, not forwarded to the laboratory for analysis. PCBs (0.12 mg/kg to 10.77 mg/kg [P-14]) were detected in a number of the selected soil samples. Areas of contamination, in

excess of the residential and industrial SCTL, were delineated based on both the field screening and laboratory results. These areas of PCB contamination were situated west of the Furnace, east of the railroad spur and south of the Structural Steel Warehouse [94] (Figure 10, Table 5).

On December 17, 1999, as part of the Interim Remedial Action, two additional soil samples (P-27 and P-28) were collected east of the P-25 soil boring location. The samples were collected from 0-1 foot bls and analyzed for PCBs. Arochlor 1016 (.011 mg/kg) and arochlor 1260 (0.007 mg/kg) were detected in the P-28 soil sample. These levels were below the residential SCTL. No PCBs were detected in the P-27 sample [101] (Figure 10, Table 5).

In October 2000, 435 tons of PCB contaminated soil was reportedly removed and transported to Kedesh Inc. in Screven, Georgia for disposal. The excavation was reportedly backfilled with clean fill. Confirmatory soil samples were collected on November 27, 2000. Confirmatory soil samples from the C-1 through C-8 locations were collected between 1-2 feet and 2-3 feet depth intervals. However, when the water table was shallow, some of the soil samples were collected at a shallower depth interval (24-30 inches bls). Soil samples C-7 through C-10 were collected between 0-1 foot bls. PCBs (0.049 to 20.7 mg/kg) were detected in a number of the soil samples. The levels detected in the C-2 (1.03 mg/kg/1-2 feet bls), C-3 (20.7 mg/kg/1-2 feet bls) and C-4 (4.08 mg/kg/1-2 feet bls) locations exceeded the residential SCTL for PCBs. Follow-up soil samples were collected from these locations on February 14, 2001. No PCBs were detected above the detection limit [101] (Figure 11, Table 6).

Groundwater samples were collected from the CGW-1 through CGW-7 well locations on November 7, 2000. The CGW-1, CGW-2, CGW-3 and CGW-7 locations match the locations of former/existing monitor wells MW-1, MW-2, MW-3 and MW-7, respectively. Three of the four existing wells had been destroyed. As a result, for uniformity, new monitor wells were installed using Direct Push Technology (DPT). The wells were constructed of one-inch diameter PVC and installed to the same depth and screen interval as the original wells. No PCBs were detected above the minimum detection limits [101] (Figure 11).

4.0 Ground-Water Pathway

4.1 Regional Hydrogeologic Setting

This site is situated in the Eastern Valley geomorphologic feature of the Northern (proximal) Physiographic Zone of Florida. This area is devoid of karst terrain. Three hydrostratigraphic units exist in the area: the surficial aquifer system, the intermediate aquifer system/confining unit and the Floridan aquifer system [1,8,9,14,15,16].

The surficial aquifer system consists of limestone and sand aquifers in the clayey sand and sandy clay, late Miocene age Hawthorn Group confining beds; the shell, limestone and sand aquifers in the Pliocene or upper Miocene age deposits ("Rock" limestone aquifer) and the sand and shell aquifers in the Pleistocene and Holocene age deposits (surficial sand aquifer). These permeable zones are separated from one another by a number of thin, discontinuous confining beds. The surficial aquifer system sediments are 50 - 100 feet thick in Duval County [8,9,12,14].

The surficial sand aquifer (water-table zone) portion of the surficial aquifer system is composed of tan to yellow, unconsolidated, fine-medium grained quartz sand. These deposits are locally stained rusty brown and red from iron oxide. The deposits may contain thin gray, sandy clay beds, which in some portions of the County contain mollusk shells, particularly near the Atlantic coast. Discontinuous layers of rusty brown hardpan (well indurated iron oxide cemented sand) underlie some of the higher elevations (2-3 feet thick). This water table zone is approximately 25-50 feet thick and the water table is found between 1 and 10 feet below land surface (bls). Recharge to the water table zone is primarily from local rainfall. The water table zone of the surficial aquifer system is used for limited lawn irrigation, stock and domestic uses [8,9,12,14,19].

The Quaternary surficial deposits are underlain by upper Miocene or Pliocene age sediments composed of sand, shell, sandy clay and limestone. These sediments are usually tan, buff or light gray and are differentiated from Hawthorn Group deposits by their lighter colors and lack of phosphate. The lower part of these deposits is composed of tan to yellow, often sandy, porous, bioclastic and cavernous limestone. A few thin beds of brown, crystalline, dolomitic limestone often interbed the limestone. This limestone "Rock" aquifer is commonly 40 to 100 feet bls in Duval County. The "Rock" limestone aquifer is the major water-yielding zone in the surficial aquifer system and is tapped by numerous private and small community supply wells in Duval County. Well yields from the limestone unit average 30 - 100 gallons per minute (gpm) with peaks as high as 200 gpm. This limestone unit is overlain by lower permeability sediments consisting of fine to medium, well sorted sand interbedded with layers of gray-green silty clay, clayey sand and shell. These beds provide an upper semi-confining bed for the "Rock" limestone aquifer. Water level elevations of the water table zone and the limestone unit are similar; however, when water levels in the water table aquifer are higher than those of the limestone unit, a downward potential, albeit small, may exist [8,9,12,14,19].

The upper Miocene or Pliocene deposits are underlain by the middle Miocene age Hawthorn Group. The upper portion of the Hawthorn is composed of gray to blue-green and olive-green clay, sandy clay, and sandy, phosphatic limestone. Abundant, well rounded, polished granules and pebbles of phosphate commonly are present. Some wells tap lenses of sand and limestone in the upper part of the Hawthorn but the Hawthorn is not considered a good source of water [8,9,12,14,18,20].

The surficial aquifer system is underlain by the intermediate aquifer system/confining unit, which is composed of between 250 to 500 feet of phosphatic carbonates, clay, silt, fine-

grained sand and shelly marl of the Hawthorn Group. The Hawthorn Group in Duval County consists of, in descending order, the Coosawhatchie Formation (including the Charlton Member), Marks Head Formation [Fm] and the Penny Farms Fm. Low permeability, silty clay and clay sediments of the Hawthorn provide a confining unit between the surficial aquifer system and the underlying Floridan aquifer system. A coarse to very coarse-grained pebbly sand unit within the Hawthorn is tapped by wells approximately 140 to 165 feet deep. Wells in this zone will yield at least 20 gpm. This permeable unit exists in portions of eastern Duval County (Mayport to Ponte Vedra) [8,9,11,14,15,18,20].

The Floridan aquifer system is the principal source of fresh water in the area and is found under artesian conditions between 500 to 550 feet bls in the metropolitan Jacksonville area. The Floridan aquifer system is composed of limestones, dolomitic limestones and dolomites of Eocene to early Miocene age. The Floridan aquifer system consists of, in ascending order, the Avon Park Fm, the Ocala Limestone and a few discontinuous, thin aquifers in the Hawthorn Group that are hydraulically connected to the rest of the aquifer. The potentiometric surface (May 1990) of the Floridan aquifer system is between 20 to 40 feet above mean sea level (MSL) in eastern Duval County. Regional flow direction within the Floridan aquifer system is to the east-northeast. The City of Jacksonville municipal water supply system is derived from wells that tap the Floridan aquifer system 1,000 to 1,500 feet deep. Due to the considerable thickness and low permeability of the upper Floridan aquifer confining beds and the high potentiometric surface elevation of the Floridan aquifer system, generally no recharge of the Floridan aquifer system takes place in the Jacksonville area [8,9,10,13,14,15,17,18,20,22,23].

4.2 Site Specific Hydrogeologic Setting

As a result of environmental investigations, a number of soil borings have been conducted at this site. The majority of the borings extended to a depth of 17.5 feet. However, one of the borings penetrated to a depth of 36 feet. Clayey sand, black fill was encountered to a depth of about one-foot. Shallow portions of the borings indicate a fine to medium grained tan-white, brownish yellow sand. Iron staining was noted in many of the borings. Clayey sand was encountered between 22 and 32 feet bls in the deep boring. However deeper sections of the boring consisted primarily of medium to coarse grained grayish, tan-brown sand. The water table was encountered between 3 and 4 feet bls. Groundwater flow across the site area was generally to the northwest and north-northwest. However, groundwater flow was determined to be to the east-northeast and northeast during high water table conditions [60,68].

4.3. Ground-Water Targets

The majority of the site area is supplied drinking water by the City of Jacksonville municipal water system. This system is divided into two separate well systems referred to as the North and South Grids. All the municipal wells are open to the Floridan aquifer system. The North Grid service area extends north to Dunn Ave., west to Jones Road,

south to Hipps Road and east to the west side of the St. Johns River. The North Grid well system consists of nine wellfields (47 wells). Three of the wellfields are located within 4 miles of the site. These wellfields include the Main Street (10 wells), Fairfax Ave. (8 wells) and Norwood Ave. (4 wells) water treatment plant (WTP) wellfields. The nearest of these wellfields is the Main Street wellfield located between 1.3 and 1.7 miles south-southwest of the site. These wells range in depth from 1248 to 1303 feet in depth. The North Grid system currently serves 420,989 people. The South Grid consists of six wellfields (24 wells). Four of the wellfields are located within 4 miles of the site. These wellfields include the Arlington (4 wells), Hendricks Ave. (3 wells), Hendricks Ave. Expansion (2 wells) and River Oaks Road (7 wells) water treatment plant (WTP) wellfields. The nearest of these wellfields are the Arlington and Hendricks Avenue Expansion wellfields located between 2.8 and 3.4 miles east-southeast and south, respectively of the site. The South Grid system currently serves 396,461 people [1,10,21,22,23].

A number of community, non-community and small public well systems are used within the grid system for potable use. These well systems collectively serve 31,173 people within 4 miles of the site. The nearest of these systems is the Jacksonville University (JU) well system. JU maintains four Floridan aquifer drinking water wells located between 2.2 and 2.4 miles east of the site. This system currently serves approximately 848 people [1,21]. A number of private wells are employed within the grid system for potable use. The majority of private drinking water wells and a few small size public well system wells are open to the Limestone "Rock aquifer" portion of the surficial aquifer system. These wells are generally open between 40-100 feet bsl. A breakdown of the community/noncommunity, municipal and private well systems, by distance, is presented in Table 7.

4.4 Ground-Water Conclusions

PCB and free phase hydraulic oil contamination has been documented at this site. However, elevated levels of heavy metals, in particular lead, may be present in percentage concentrations in site soils near the former lead smelter. If so, lead contamination to the surficial aquifer system is likely. A number of public drinking water wells are located in the site area. Based on these facts, the groundwater migration pathway is a pathway of concern at this site.

5.0. Surface Water Pathway

5.1 Hydrology

Soils at the site are classified as either Arents, Leon-Urban Land Complex or Pottsburg Fine Sands. Arents and Leon-Urban Land Complex soils have been reworked by manmade activities. Arents are poorly drained soils and consist of various shades of gray, brown and red fine sand, sandy loam and sandy clay loam. These soils are present in the northern and central portions of the site. The Leon Fine sand portion of the Leon-Urban Land complex series is found in lawns, vacant lots or playgrounds. The Urban Land portion consists of

areas covered by impervious surfaces (driveways, buildings, parking lots, etc). The Leon-Urban Land Complex occupies the central and southern portions of the site. The Pottsburg Fine Sand consists of poorly drained, gray, brown to grayish-brown fine sand. This unit is present in the southern portion of the site [35].

The site is relatively flat and situated 20 to 22 feet above National Geodetic Vertical Datum (NGVD). The site is located outside of the 500-year floodplain. The majority of the stormwater runoff reportedly flows northwest to southeast across the site and is reportedly conveyed to Long Branch. Long Branch is an east to northeast flowing tributary of the St. Johns River, located approximately 3,000 feet north of the site. The St. Johns River is located about 1.25 miles northeast of the site [1,24,60,68] (Figure 1).

The St. Johns River evolved from a lagoon that was formerly enclosed by a barrier which remains in relict form as the Atlantic Coastal Ridge. The St. Johns River is a flat, meandering river that discharges into the Atlantic Ocean near Mayport. This portion of the St. Johns River is a tidally influenced, high salinity, estuarine water body. The net flow of the St. Johns River, near the probable point of entry (PPE), is downstream to the Atlantic Ocean. However, due to tidal cycles, flow reversals do occur (approximately 30% of the time). The Atlantic Ocean is located more than 20 miles downstream of the confluence of Long Branch and the St. Johns River [1,26,31,40] (Figures 1,2).

5.2 Surface Water Targets

No drinking water surface water intakes are located along the surface water migration pathway [10,22]. No major fisheries exist in Long Branch. However, some recreational "cane pole" fishing may take place. The St. Johns River is utilized for commercial and recreational fishing. Blueback herring, Hickory shad and American shad are commercially harvested from St. Johns River waters [26]. An estimated 7,845,692 pounds of finfish, shellfish and shrimp were harvested from Duval County marine and estuarine waters during 1990 [25].

The St. Johns River is a federally designated critical habitat for the endangered West Indian manatee [26,27,28]. Two manatee aggregation areas (overwintering areas) are located near the confluence of Long Branch and the St. Johns River. These aggregation areas are located near warm water discharge points to the River [26,27,30,31]. In addition, this portion of the St. Johns River is a migratory area for the federally designated endangered shortnose sturgeon. Bald eagle (federally threatened species) and Red-cockaded woodpecker (federally endangered species) nests have also been identified along this portion of the St. Johns River [27,31,36]. This portion of the river is also a nesting area for the American oystercatcher (State Species of Special Concern [SSC]) and a breeding/nursery area for shrimp and crab [27,31].

5.3 Surface Water Pathway Conclusions

As detailed earlier, heavy metal soil contamination, as a result of former lead smelting activities, may exist at this site. Given this scenario, it is possible that heavy metals, particularly lead, may have been transported to downstream water bodies. A number of fisheries and sensitive environments have been identified in the St. Johns River watershed. Further evaluation of this pathway is warranted.

6.0 Soil Exposure and Air Migration Pathways

6.1 Physical Conditions

The Berman Brothers Inc. property consists of a warehouse (structural steel and pipe storage), the Crane Building and a furnace. Scrap metal processing and materials storage is conducted in the northern part of the property. Ferrous metal recovery and processing is conducted in the southwest portion of the property at the Motor Assembly (Shear House) area and metal shredder. At least one railroad spur is present on the site. A number of metal scrap piles were observed during the April 2002 windshield survey. The site is partially fenced. However, site access is not restricted [60,68,109] (Figures 3-8).

6.2 Soil and Air Migration Targets

A small worker population likely exists on-site. However, no residential population or terrestrial sensitive environments are reported on-site [1,30,109]. However, a number of abandoned homes were identified near the site during the windshield survey. It is currently unclear why the homes were abandoned. The Jacksonville area is heavily populated. The City of Jacksonville has a population density of 837.3 people per square mile [29]. Based on 2000 Tiger Database Census data, there are 139,695 people living within 4 miles of the site [41]. A number of sensitive environments have been identified within 4 miles of the site. (Please refer to the Surface Water Targets Section (Section 5.2) for those sensitive environments).

6.3 Soil Exposure and Air Pathway Conclusions

No residents or terrestrial sensitive environments exist on-site. However, further inquiry regarding the abandoned homes near the site should be conducted. As a result, the soil exposure pathway may be a concern at this site. A large population and a number of sensitive environments exist within 4 miles of the site. However, no air releases have been reported to date. Therefore, the air migration pathway does not appear to be a major concern at this time.

7.0 Summary and Conclusions

The Florida Smelting Co. aka Berman Brothers site is located at 2726 Evergreen Avenue, Jacksonville, Duval County, Florida. The Florida Smelting Co. (FSC) began operating in

1940 and since the beginning of its operations has been known to have another address of 18th Street and Evergreen. FSC operated at the 2726 Evergreen Avenue location until at least 1946, when the site became Albright and Company, Junk. In 1950, it appears that FSC began operations at another facility at 5800 Buffalo Avenue. Berman Brothers Incorporated, a scrap metal processor, currently occupies the site and has owned the property since 1965.

FSC reportedly performed lead smelting. Site file information indicates that FSC used batteries as a primary feedstock for lead. The site file also indicates that a scrap yard existed at this site since the 1930's. It is reported that ferrous and non-ferrous processing operations have been conducted in the northern portion of the site throughout its history. A metal compacting machine, which was hydraulically powered, was formerly located at the site. As a result, other sources of scrap lead were likely used at the site.

The typical secondary smelting process involved lead scrap and lead components from used car batteries. The lead posts and grids were recovered from the batteries for smelting. The smelter operation typically consisted of reverberatory or blast furnaces, which were used to produce soft pure lead or specialty alloys. As part of the refining process, some smelting operations introduced antimony, arsenic and cadmium for the desired product. The furnaces were periodically opened to remove slag (60-70% lead) and a soft pure lead product. Studies at other former secondary lead smelting sites indicate that lead concentrations in surface soils may exceed 1% near the smelters. A study of soils at eight former secondary smelting facilities in Baltimore and Philadelphia indicated lead concentrations ranging from 306 mg/kg to 2,550 mg/kg. EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) have identified lead as the leading priority contaminant at Superfund sites. Both EPA and ATSDR consider lead a serious public health problem, particularly in children.

The operations at Berman Brothers, Inc. consists of non-ferrous scrap processing of copper, brass, aluminum lead, stainless steel and ferrous scrap processing and storage of new structural steel and piping supplies. Approximately 60% of the scrap operation involves new steel. However, a smelting furnace is used for aluminum and zinc extraction. The dross is reportedly stockpiled adjacent to the building. It is currently unclear whether this furnace is the same as the one used by FSC. Hundreds of transformers from the Jacksonville Electric Authority (JEA) were stored on site. This portion of the site was reportedly leased from the Jacksonville Port Authority (JPA). The oils in the transformers, which contained Polychlorinated Biphenyls (PCBs), were removed and placed into two on-site tanks (10,000 gallon and 6,000 gallon capacity). Numerous spills were reported to have occurred as a result of these activities. The owner reported that most of the oil was sold.

Various contamination assessment investigations at the site confirmed both hydraulic oil and PCB contamination of site soils and groundwater. However, only a limited number of heavy metal analyses were conducted. A number of soil excavation and disposal activities

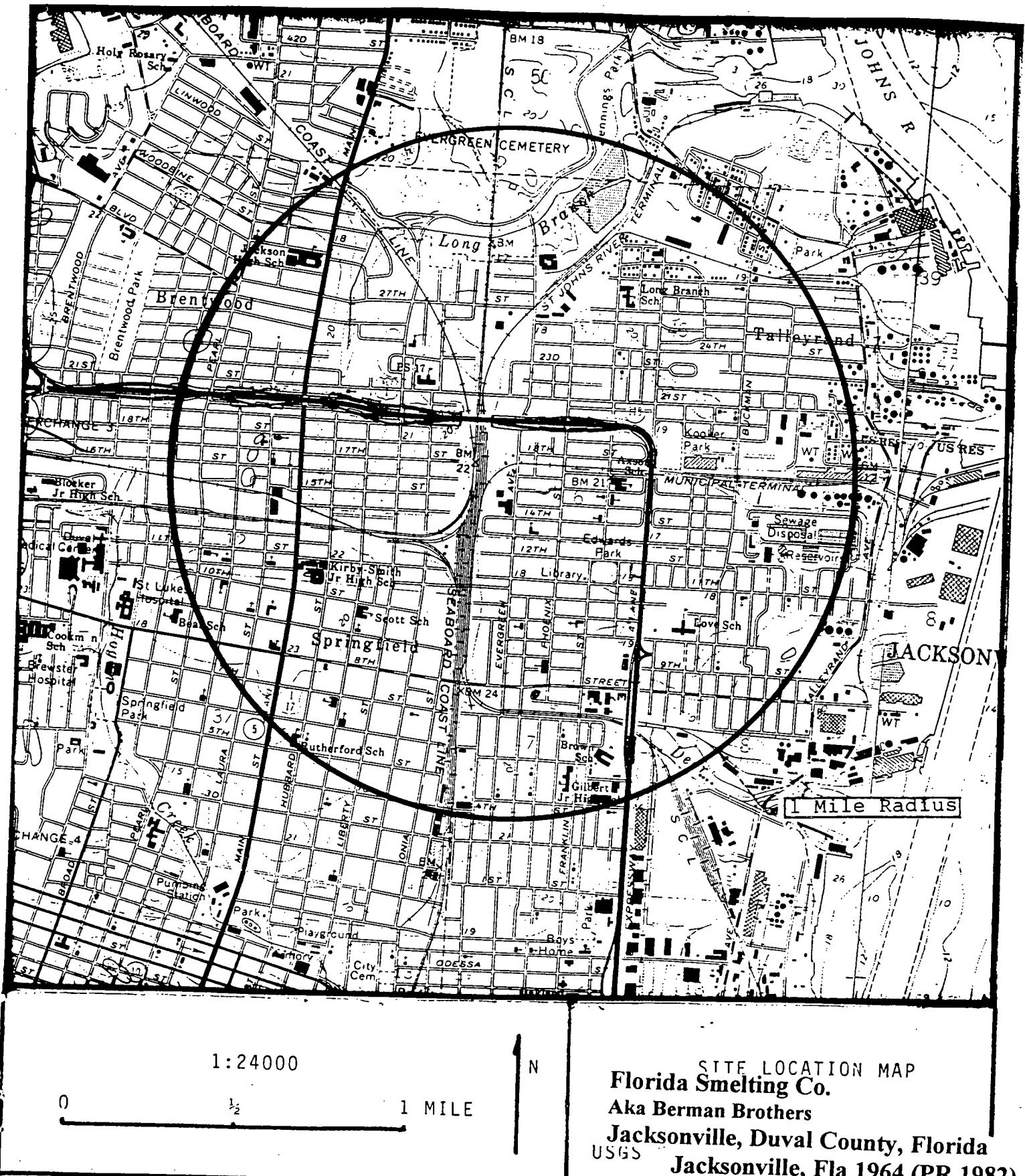
reportedly occurred at this site. However, documentation of the ultimate disposition of the excavated PCB soils has not been provided to FDEP.

Elevated levels of heavy metals, in particular lead, may be present in percentage concentrations in site soils near the former lead smelter. If so, lead contamination to the surficial aquifer system is likely. A number of public drinking water wells are located in the site area. Based on these facts, the groundwater migration pathway is a pathway of concern at this site.

As detailed earlier, heavy metal soil contamination, as a result of former lead smelting activities, may exist at this site. Given this scenario, it is possible that heavy metals, particularly lead, may have been transported to downstream water bodies. A number of fisheries and sensitive environments have been identified in the St. Johns River watershed. Further evaluation of this pathway is warranted.

No residents or terrestrial sensitive environments exist on-site. However, further inquiry regarding the abandoned homes near the site should be conducted. As a result, the soil exposure pathway may be a concern at this site. A large population and a number of sensitive environments exist within 4 miles of the site. However, no air releases have been reported to date. Therefore, the air migration pathway does not appear to be a major concern at this time.

Based on past activities at this site, the likely presence of contaminated soil and groundwater and the proximity of the site to public drinking water wells, further CERCLA action is warranted at this site on a high priority basis. Therefore a Site Inspection (SI) is recommended for this site.



Lead Sites

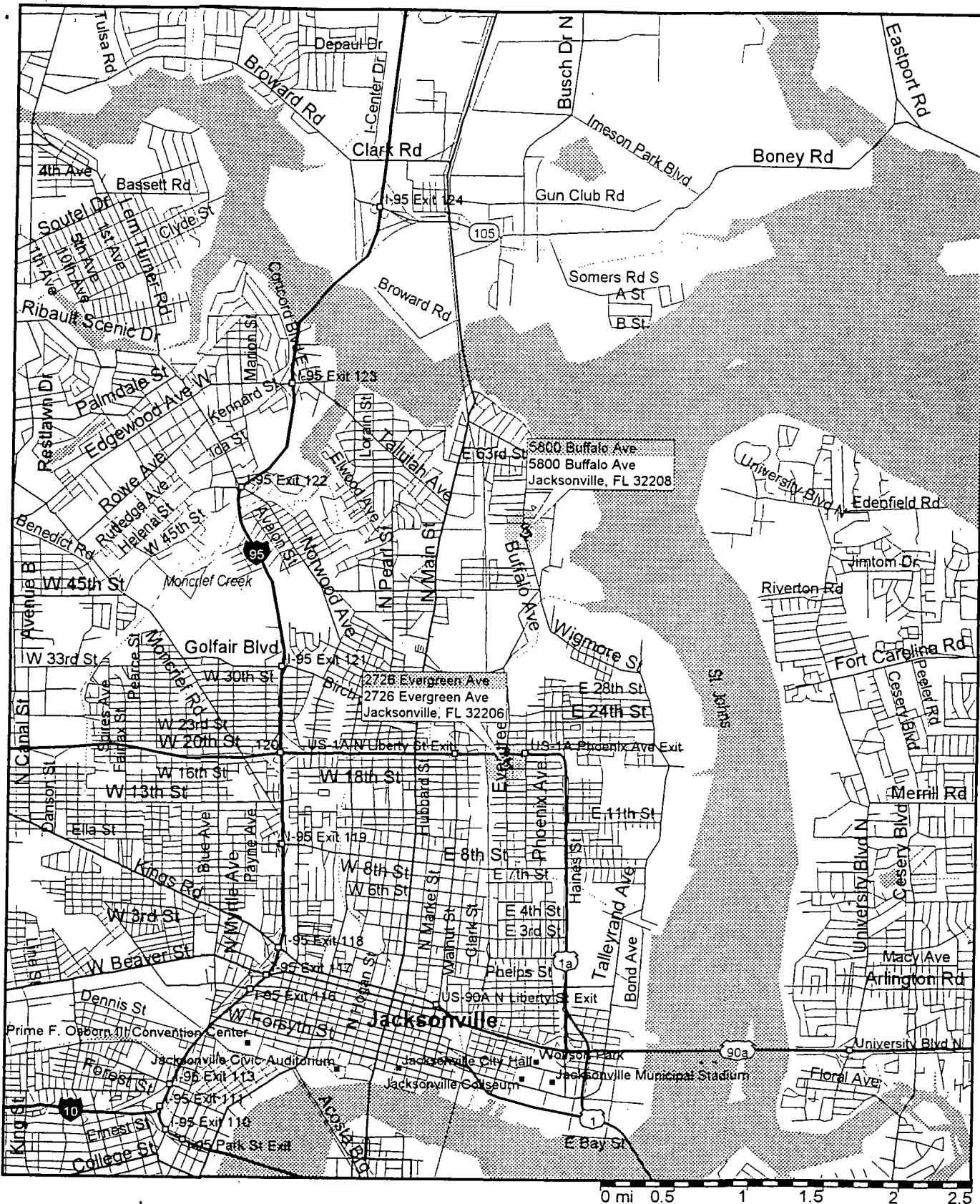


Figure 2

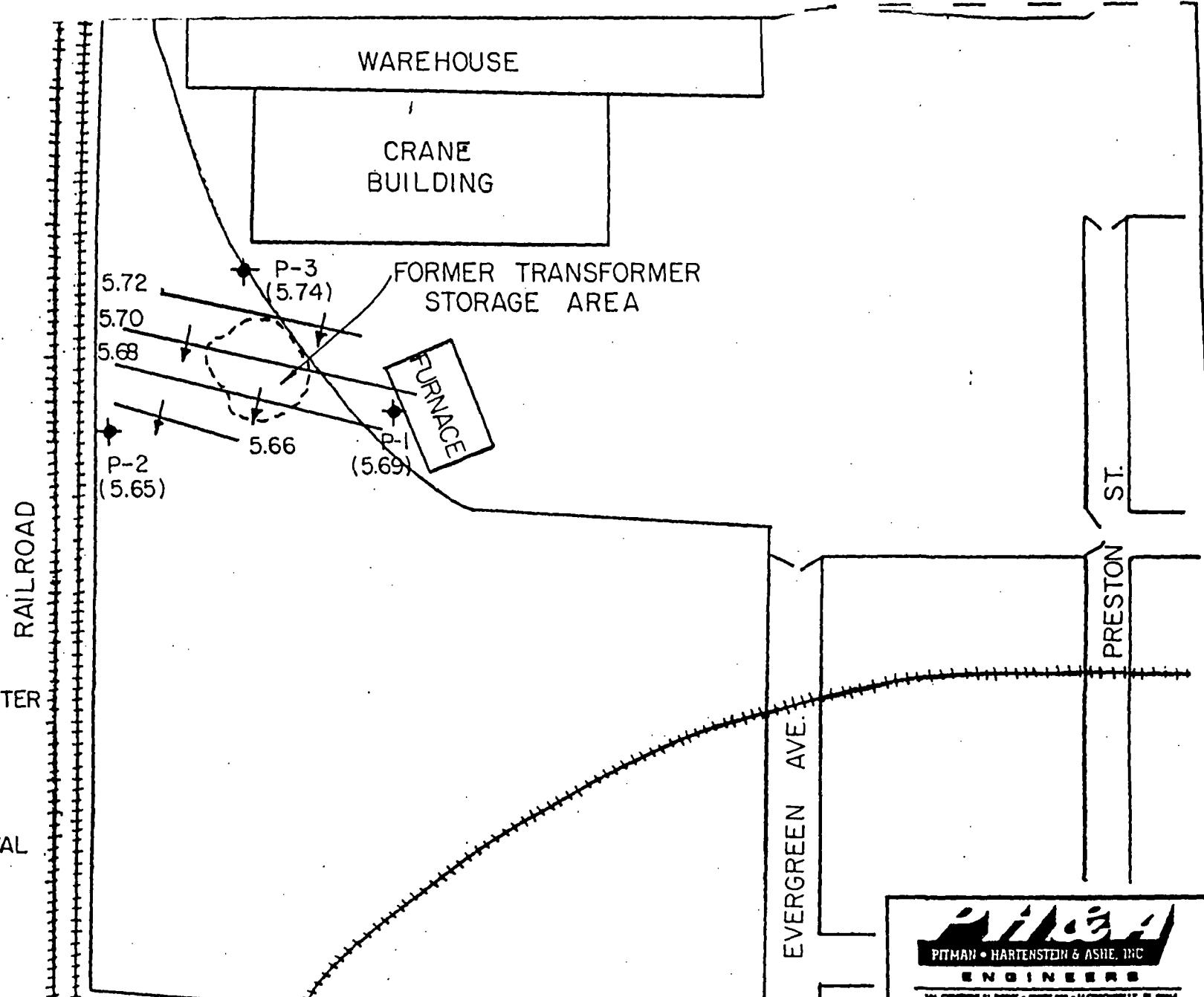


Figure 3

GROUND WATER FLOW DIRECTION MAP

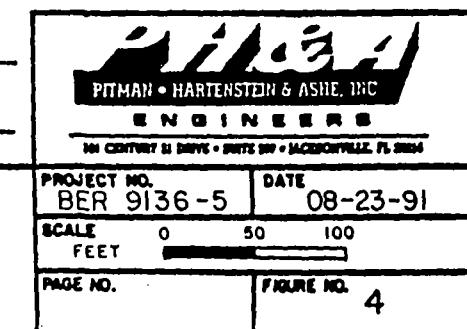
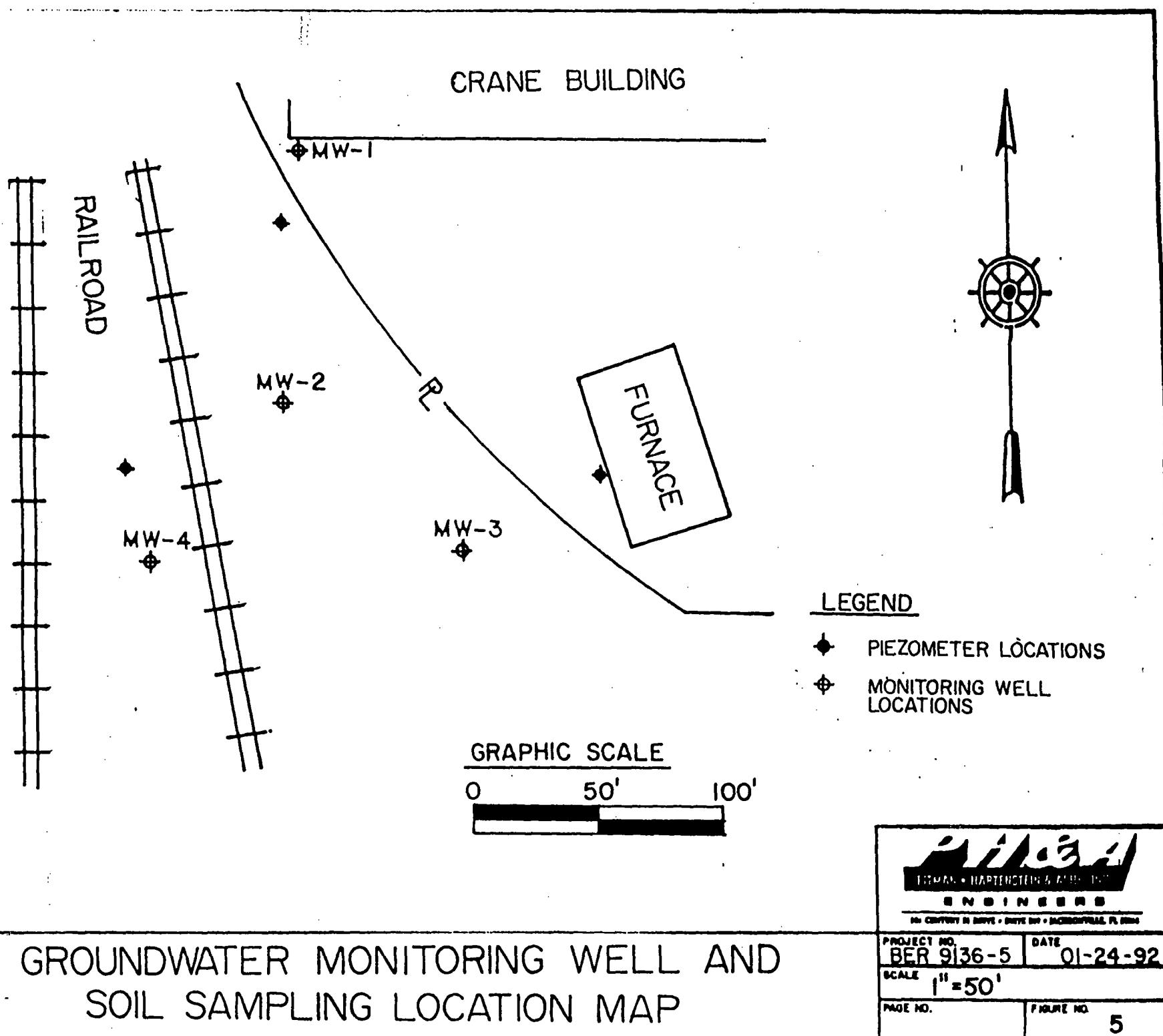


Figure 4



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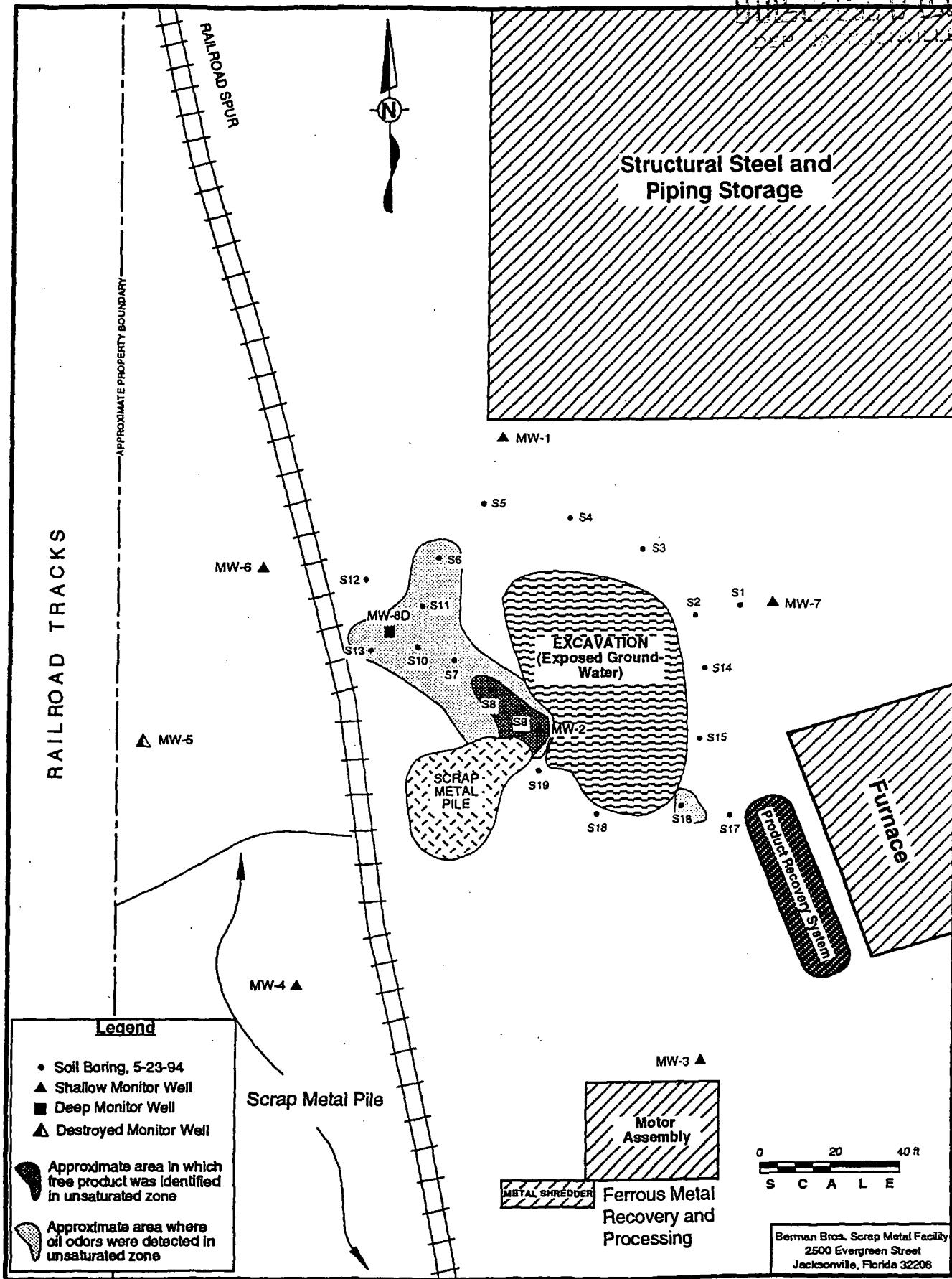


Figure 2. Results of Qualitative Soil Survey Conducted May 23, 1994

Figure 5 EARTH SYSTEMS

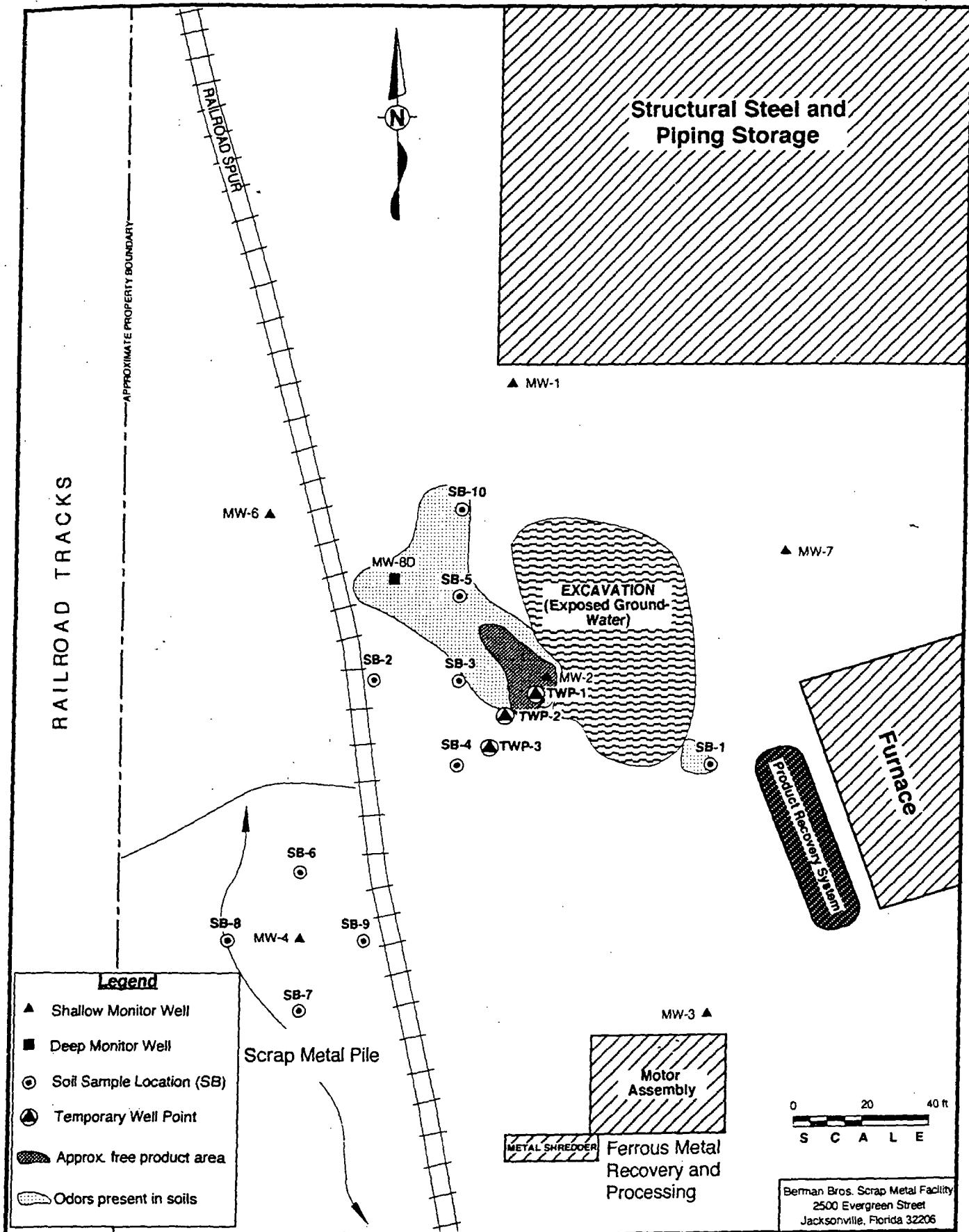


Figure 6 **EARTH SYSTEMS**

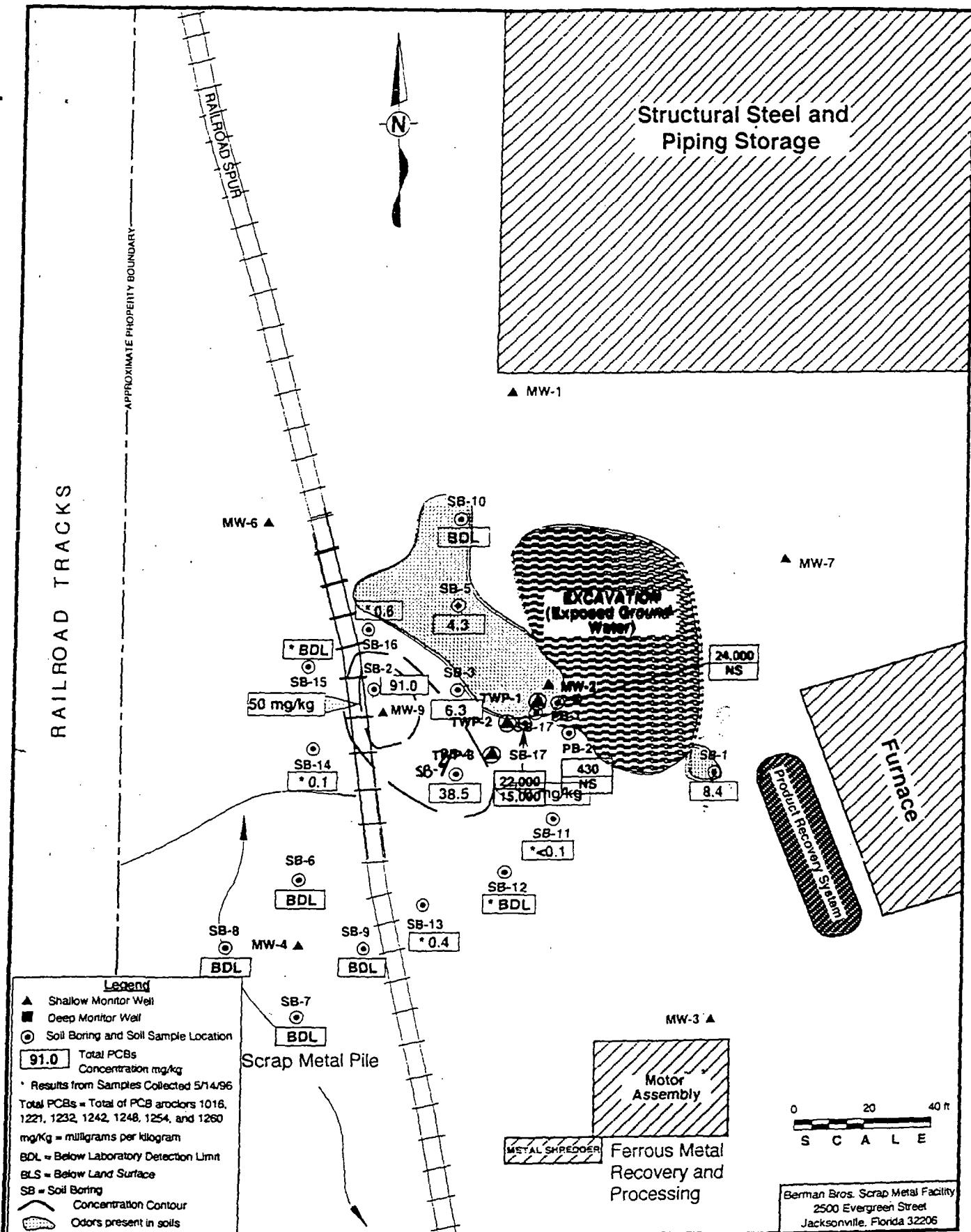


Figure 1. Extent of PCBs in Soils Within One Foot Below Land Surface

EARTH SYSTEMS

Figure 7

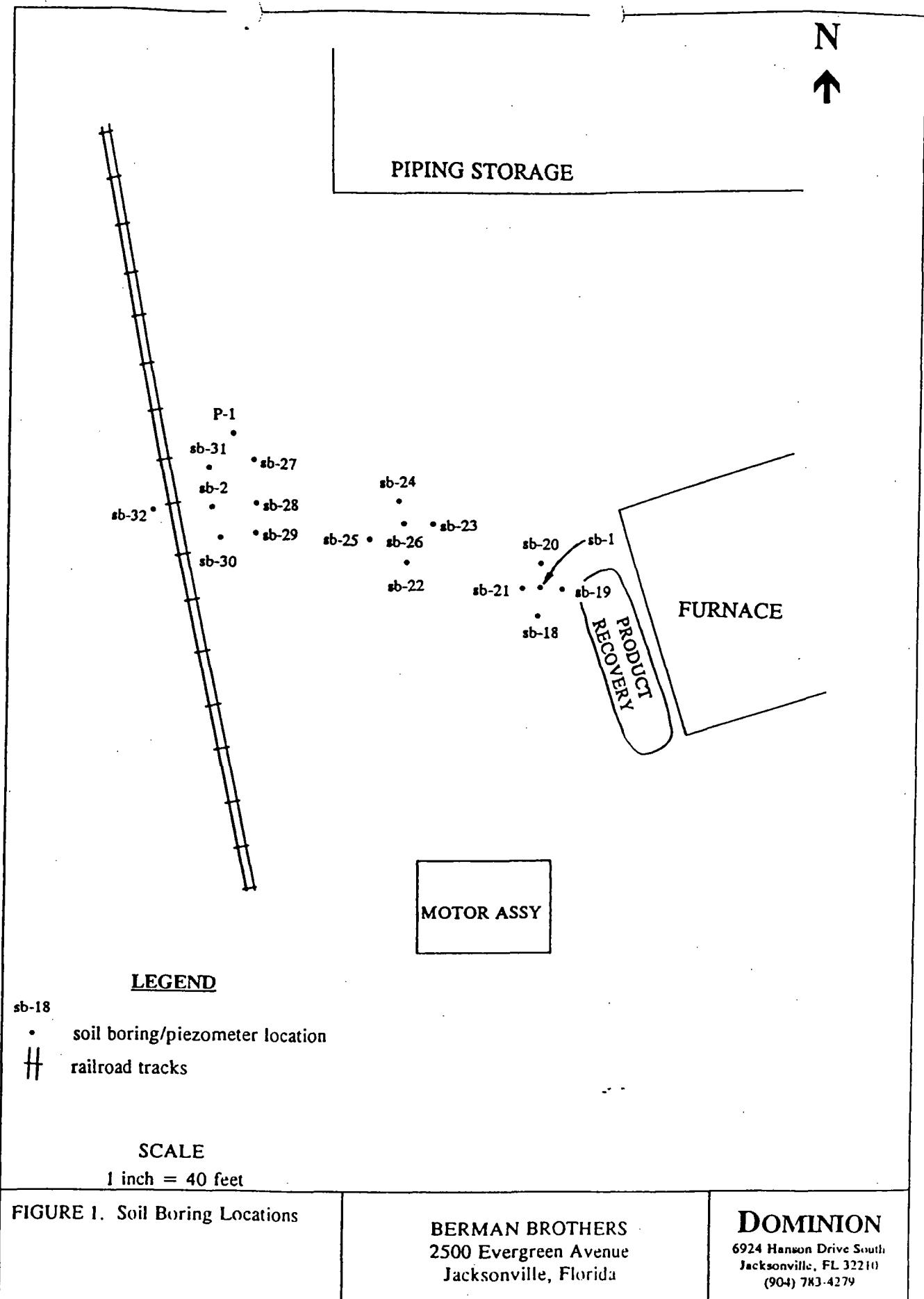


Figure 8

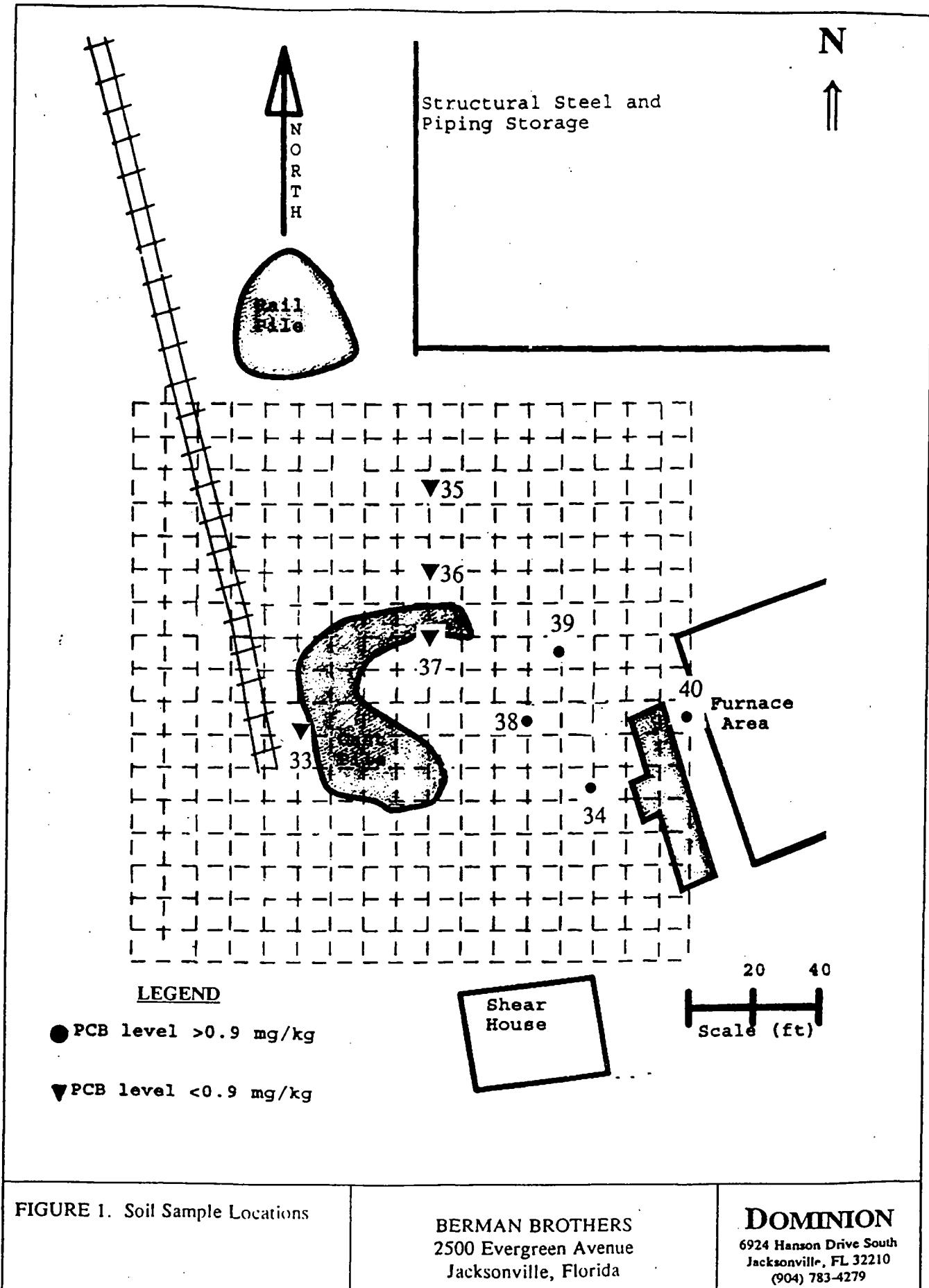


Figure 9

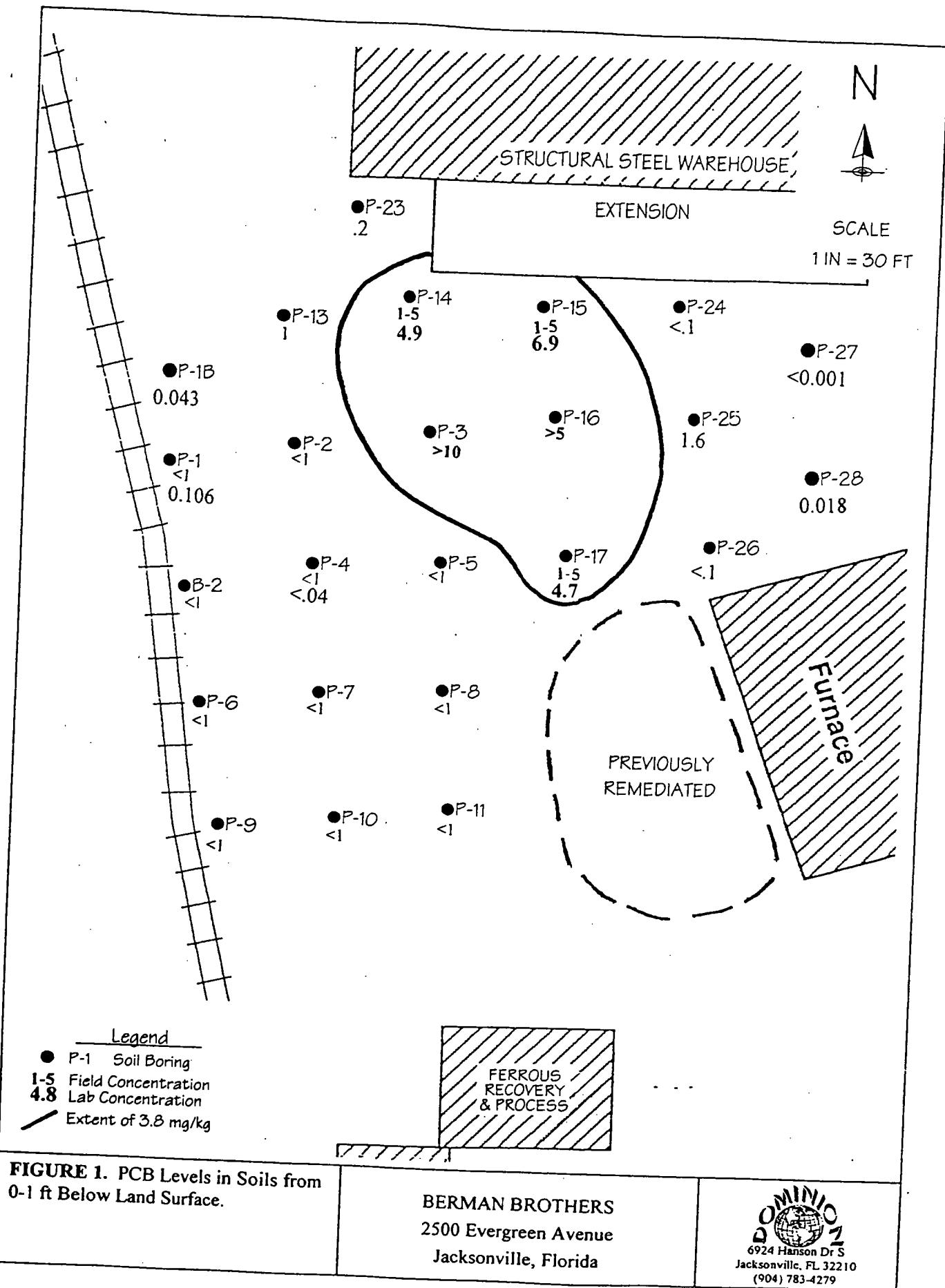


Figure 10

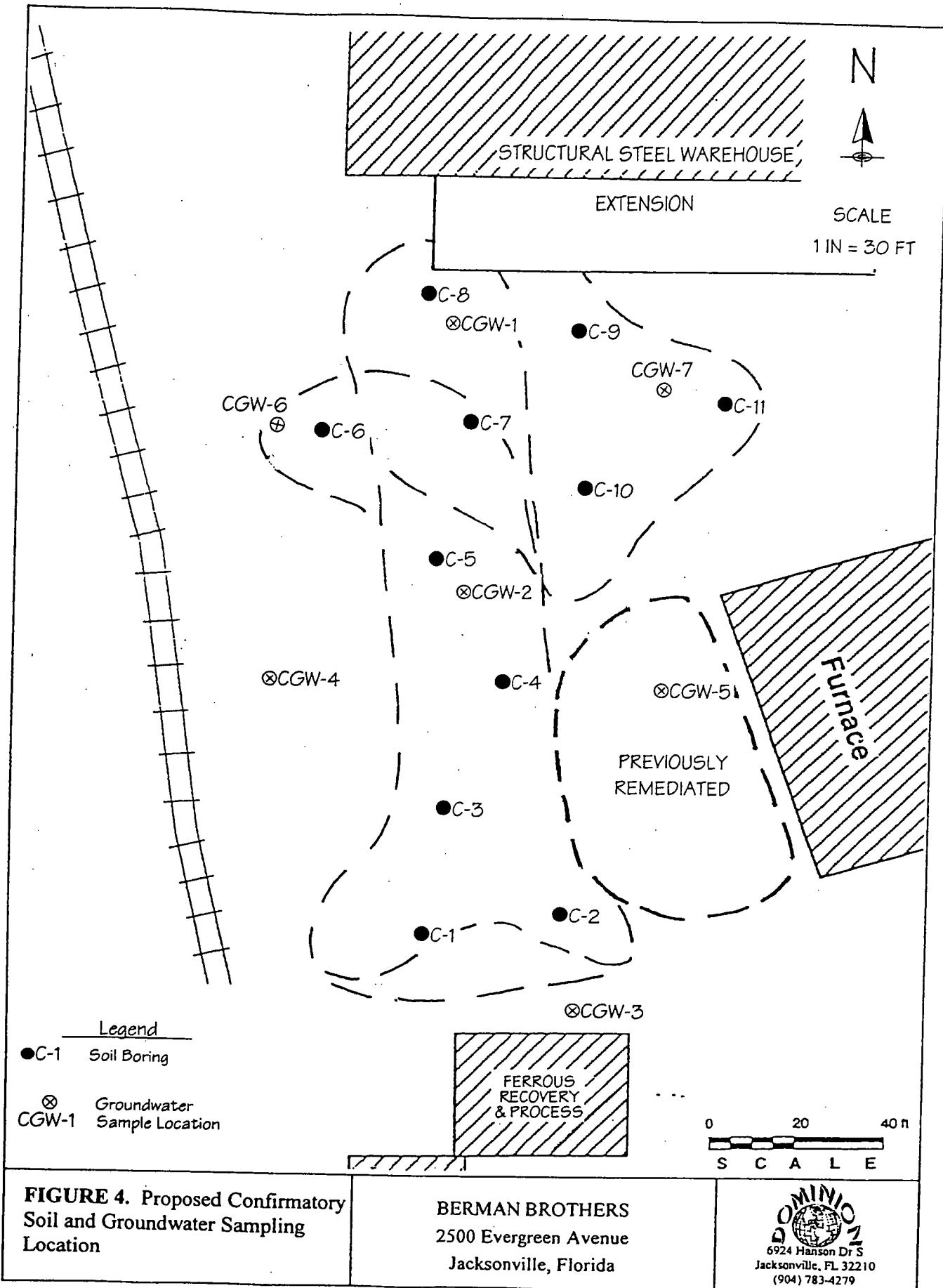


Figure 11

TABLE 4 - GROUND WATER ANALYTICAL RESULTS SUMMARY

<u>PARAMETER</u>	<u>Unit</u>	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>	<u>Standard</u>
<u>Initial Sampling Event:</u>						
PCBs	UG/L	<0.7	5.0	<0.7	10.0	PQL ⁽¹⁾
Barium	MG/L	0.096	0.446	0.204	0.095	1.00 ⁽²⁾
Lead	MG/L	0.483	0.065	0.525	0.044	0.05 ⁽²⁾
<u>Second Sampling Event:</u>						
PCBs	UG/L	NA	<0.65	NA	<0.65	PQL ⁽¹⁾
Lead ⁽³⁾	MG/L	<0.025	<0.025	<0.025	NA	0.05 ⁽²⁾

UG/L = Micrograms per liter or parts per billion (ppb).

MG/L = Milligrams per liter or parts per million (ppm).

NA = Not analyzed.

Notes:

- (1) PQL = Practical Quantitation Limit as listed in the document *Ground Water Guidance Concentrations*, Florida Department of Environmental Regulation, Division of Water Facilities, Bureau of Ground Water Protection, February 1989.
- (2) Primary drinking water standard.
- (3) Unfiltered fraction.

Table 2

Table 5. Soil Sample Analytical Results
 2500 Evergreen Avenue
 Jacksonville, FL

INTEGRATED ENVIRONMENTAL SOLUTIONS (12/3/91)																		
Well Boring	Highest Net OVA-FID Result (ppm)	RCRA Metals (mg/kg)								PCBs (EPA Method 8080)				Polynuclear Aromatics (PAHs) EPA Method 8310 (µg/kg)				
		Silver	Arsenic	Barium	Cadmium	Chromium	Mercury	Lead	Selenium	Total PCBs (mg/kg)				Total Naphthalenes	Other PAHs			
MW-1	NM	<1.0	<1.0	1.08	<1.0	<1.0	<0.5	<1.0	<1.0	<0.1				NA	NA			
MW-2	NM	<1.0	<1.0	5.10	<1.0	<1.0	<0.5	7.60	<1.0	5.0				NA	NA			
MW-3	NM	<1.0	<1.0	5.14	<1.0	1.16	<0.5	40.80	<1.0	0.4				NA	NA			
MW-4	NM	<1.0	<1.0	1.78	<1.0	<1.0	<0.5	2.90	<1.0	3.0				NA	NA			
EARTH SYSTEMS (6/12/92)															Total PCBs (µg/kg)			
										Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260		
SS-1	NM	NA	NA	NA	NA	NA	NA	NA	NA	<370	<370	<370	<370	8000	<370	<370		
EARTH SYSTEMS (9/14/93)															76	267		
MW-6	0	<1	<5	3	<0.5	3	<0.1	<5	<10	<40	<40	<40	<40	<40	54	<50	ND	ND
MW-8D	4	<1	<5	4	<0.5	3	<0.1	<5	<10	<41	<41	<41	<41	54	<41	<41	ND	ND

ND = None Detected

NM = Not Measured

NA = Not Analyzed

Samples were composited from land surface to soil/water interface (approximately 3 ft bbls).

EARTH SYSTEMS

Table 6. Ground-Water Analytical Results

2500 Evergreen Avenue

Jacksonville, FL

Sampling Performed by Integrated Environmental Solutions											
Well ID	Sampling Date	RCRA Metals (mg/L)								Total PCBs (µg/L)	
		Silver	Arsenic	Barium	Cadmium	Chromium	Mercury	Unfiltered	Filtered		
MW-1	12/4/91	<.025	<.025	0.096	<.025	<.025	<.005	0.483	---	<.025	<.7
	1/9/92	---	---	---	---	---	---	<.025	<.025	---	---
MW-2	12/4/91	<.025	<.025	0.446	<.025	<.025	<.005	0.065	<.025	<.025	5.0
	1/9/92	---	---	---	---	---	---	<.025	<.025	---	<.65
MW-3	12/4/91	<.025	<.025	0.204	<.025	<.025	<.005	0.525	---	<.025	<.7
	1/9/92	---	---	---	---	---	---	<.025	<.025	---	---
MW-4	12/4/91	<.025	<.025	0.095	<.025	<.025	<.005	0.044	---	<.025	10.0
	1/9/92	---	---	---	---	---	---	---	---	---	<.65

Sampling Performed by Earth Systems											
Well ID	Sampling Date	PCBs (µg/L)								Method 610 Parameters (µg/L)	
		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Total Naphthalenes	Other PAHs
MW-1	11/2/93	<1	<2	<1	<1	<1	<1	<1	ND	ND	ND
MW-2	11/2/93	---	---	---	---	---	---	---	---	---	---
MW-3	11/2/93	<1	<2	<1	<1	<1	<1	<1	ND	ND	ND
MW-4	11/2/93	<1	<2	<1	250	<1	<1	11	261	ND	ND
	2/4/94	<1	<2	<1	200	<1	<1	8.2	208.2	---	---
	Filtered	<1	<2	<1	<1	<1	<1	<1	ND	---	---
MW-5	11/2/93	<1	<2	<1	<1	<1	<1	<1	ND	ND	ND
MW-6	11/2/93	<1	<2	<1	<1	<1	<1	<1	ND	ND	ND
MW-7	11/2/93	<1	<2	<1	<1	<1	<1	<1	ND	ND	ND
MW-8D	11/2/93	<1	<2	<1	<1	<1	<1	<1	ND	ND	ND

---- = Not sampled

ND = None Detected

Table 1 Total PCBs in Soil Borings
Berman Brothers Scrap Metal Facility
2500 Evergreen Street
Jacksonville, Florida

Soil Boring	Date of Sampling	Sample Depth	Total PCBs (mg/Kg)
SB-1	10/12/96	6" - 12"	8.40
		18" - 24"	1.21
SB-2	10/12/96	6" - 12"	91.00
		18" - 24"	67.50
SB-3	10/12/96	6" - 12"	6.25
		18" - 24"	16.20
SB-4	10/12/96	6" - 12"	38.50
		18" - 24"	5.63
SB-5	10/12/96	6" - 12"	4.32
		18" - 24"	BDL
SB-6	2/21/96	6" - 12"	BDL
		18" - 24"	BDL
SB-7	2/21/96	6" - 12"	BDL
		18" - 24"	BDL
SB-8	2/21/96	6" - 12"	BDL
		18" - 24"	BDL
SB-9	2/21/96	6" - 12"	BDL
		18" - 24"	BDL
SB-10	2/21/96	6" - 12"	BDL
		18" - 24"	BDL

mg/Kg - Milligram per kilogram

BDL - Below Laboratory Detection Limit

Total PCBs - Total of PCB aroclors 1016, 1221, 1232, 1242, 1254, and 1261

Table 4

EARTH SYSTEMS

Table 1. Pre-Remediation PCB Levels (mg/kg) in Soil

Sample Location	Sample Date	Vertical Interval					
		0-1 ft		1-2 ft		2-3 ft	
		Field	Lab	Field	Lab	Field	Lab
P-1	3/18/99	<1	0.106 (12/17/99)	<1	ND	<1	ND
P-2	3/18/99	<1	ND	<1	ND	1-5	5.95
P-3	3/18/99	>10	ND	>10	ND	1-5	4.79
P-4	3/18/99	<1	<0.04	<1	ND	<1	ND
P-5	3/18/99	<1	ND	>10	ND	~10	ND
P-6	3/18/99	<1	ND	<1	ND	<1	ND
P-7	3/18/99	<1	ND	<1	ND	<1	ND
P-8	3/18/99	<1	ND	>10	ND	>10	ND
P-9	3/18/99	<1	ND	<1	ND	<1	ND
P-10	3/18/99	<1	ND	<1	ND	<1	ND
P-11	3/18/99	<1	ND	5-10	ND	5-10	ND
P-12	4/2/99	ND	ND	ND	ND	<1	ND
P-13	4/2/99	1	ND	1-5	0.85	<1	ND
P-14	4/2/99	1-5	4.85	1-5	10.77	<1	ND
P-15	4/2/99	1-5	6.88	<1	ND	<1	ND
P-16	4/2/99	>5	ND	1-5	1.72	1-5	<2
P-17	4/2/99	1-5	4.7	<1	ND	<1	ND
P-18	4/2/99	ND	ND	>5	ND	>5	ND
P-19	4/2/99	ND	ND	>5	ND	<1	ND
P-20	4/2/99	ND	ND	>5	ND	>5	ND
P-21	8/20/99	ND	ND	ND	<0.1	ND	<0.1
P-22	8/20/99	ND	ND	ND	<0.1	ND	<0.1
P-23	8/20/99	ND	0.22	ND	0.12	ND	ND
P-24	8/20/99	ND	<0.1	ND	ND	ND	ND
P-25	8/20/99	ND	1.61	ND	<0.1	ND	<0.1
P-26	8/20/99	ND	<0.1	ND	ND	ND	ND
P-27	12/17/99	ND	<0.001	ND	ND	ND	ND
P-28	12/17/99	ND	0.018	ND	ND	ND	ND

ND - no data

bold indicates that the value is above the residential, direct exposure limit

shaded indicates that the value is above the industrial limit

Table 2. Post-Remediation PCB Levels (mg/kg) in Soil

Sample Location	Sample Date	Vertical Interval		
		0-1 ft	1-2 ft	2-2.5 ft
C-1	11/27/00	ND	0.15	0.153
C-2	11/27/00	ND	1.03	1.522
	2/14/1	ND	BDL	ND
C-3	11/27/00	ND	20.7	0.042
	2/14/1	ND	BDL	ND
C-4	11/27/00	ND	4.076	1.33
	2/14/1	ND	BDL	ND
C-5	11/27/00	ND	0.021	7.4
C-6	11/27/00	ND	ND	0.049
C-7	11/27/00	0.043	BDL	11
C-8	11/27/00	1.79	BDL	ND
	2/14/1	BDL	ND	ND
C-9	11/27/00	BDL	ND	ND
C-10	11/27/00	BDL	ND	ND
C-11	11/27/00	ND	ND	ND

ND - no data

BDL - below instrument detection limit

bold indicates that the value is above the residential, direct exposure limit

Table 7
 Estimated Number of Potable Wells and Population Served
 Florida Smelting Co.
 aka: Berman Brothers
 Jacksonville, Duval County, Florida
 Limestone "Rock" Aquifer/Floridan aquifer system (AOC)

Well Type	0- 1/4 mile	1/4-1/2 mile	1/2-1 mile	1-2 miles	2-3 miles	3-4 miles
Municipal ¹	0/0	0/0	0/0	12/107,486	12/122,610	14/231,269
Community/ Noncomm ²	0/0	0/0	0/0	0/0	6/28,976	7/2,197
Private ³	NE	NE	NE	NE	NE	NE
Totals	0/0	0/0	0/0	12/107,486	18/151,586	21/233,466

Key:

NE=Not Evaluated

AOC=Aquifer of Concern

Footnotes:

¹ City of Jacksonville. This system is divided into two separate well systems referred to as the North and South Grids. All the municipal wells are open to the Floridan aquifer system. The North Grid well system consists of nine wellfields (47 wells). Three of the wellfields are located within 4 miles of the site. These wellfields include: the Main Street (10 wells), Fairfax Ave. (8 wells) and Norwood Ave. (4 wells) water treatment plant (WTP) wellfields. The nearest of these wellfields is the Main Street wellfield located between 1.3 and 1.7 miles south-southwest of the site. The North Grid system currently serves 420,989 people. The South Grid consists of six wellfields (24 wells). Four of the wellfields are located within 4 miles of the site. These wellfields include: the Arlington (4 wells), Hendricks Ave. (3 wells), Hendricks Ave. Expansion (2 wells) and River Oaks Road (7 wells) water treatment plant (WTP) wellfields. The nearest of these wellfields are the Arlington and Hendricks Avenue Expansion wellfields located between 2.8 and 3.4 miles east-southeast and south, respectively of the site. The South Grid system currently serves 396,461 people. No one well provides more than 40 % of the system's needs. Apportionment (North Grid) = 420,989 people/47 wells = 8,957.2 people per well. Apportionment (South Grid) = 396,461 people/24 wells = 16,519.2 people per well [1,3,10,21,22,23].

² The larger size public well systems are open to the Floridan aquifer system. The community and noncommunity well data, including aquifer use, was provided by FDEP's PWS Potable well search database [21]. These locations, in addition to the municipal well locations, were subsequently plotted on the 4-Mile USGS topographic Tiger database map collage of the site [1].

³ The average persons per household in Duval County (1990 U.S. Census) is 2.54 [1,29].

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88. Record of Conversation. July 8 & 9, 1998. Record on Conversation between S. Manning, Attorney for Berman Brothers and B. Kelley of FDEP. Re: Contaminated Fill material.
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91. Advanced Environmental Laboratories Inc. June 26, 1998. Berman Brothers Inc. Fill Material Soil Sample Laboratory analysis results.
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94. Dominion, Inc. September 27, 1999. Supplemental Contamination Assessment Berman Brothers 2500 Evergreen Avenue, Jacksonville, Florida.
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98. Record of Telephone Conversation. February 18, 2000. Record of conversation between P. Laymon of Dominion, Inc. and B. Kelley of FDEP Re: Berman Brothers IRAP progress.
99. Kelley, B. of FDEP to C. Berman of Berman Brothers. July 21, 2000. Letter regarding non-submittal of IRA report.
100. Laymon, P. of Dominion, Inc. to B. Cheary of FDEP. January 5, 2001. IRAP Update submittal and related attachments.
101. Dominion. Inc. June 18, 2001. Report of Interim Remedial Actions Berman Brothers 2500 Evergreen Avenue, Jacksonville Florida.
102. Kissam, B.T. of FDEP to C. Berman of Berman Brothers. July 17, 2001. Interim Remedial Actions report review comments letter.
103. Laymon, P. of Dominion, Inc. to T. Kissam of FDEP. December 10, 2001. IRA Response to FDEP Comments.
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105. Kissam, B.T. of FDEP to C. Berman of Berman Brothers. December 18, 2001. Letter with response to FDEP Comments.
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108. Kissam, B.T. of FDEP to J. McCarthy of FDEP. July 8, 2002. E-mail regarding current enforcement status of Berman Brother site in Jacksonville.

109. Record of Conversation. July 11, 2002. Record of conversation between J. McCarthy of FDEP and T. Kinner and N. Murchison of FDEP Re: Windshield Survey of Berman Brothers, Inc. aka: Florida Smelting Co site in Jacksonville, Florida.
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